# SELECTION GUIDE

The set output voltage, the package type, the auto-discharge function[1] and the start-up sequence control are user-selectable options.

**Selection Guide**

| Product Name | Package | Quantity per Reel | Pb Free | Halogen Free |
|---|---|---|---|---|
| RP152Lxxx∗-TR | DFN1212-6 | 5,000 pcs | Yes | Yes |
| RP152Nxxx∗-TR-FE | SOT-23-6 | 3,000 pcs | Yes | Yes |

xxx: Specify the combination of set output voltage ($V_{SET}$) within the range of 0.8 V to 3.6 V in 0.1 V step.

∗: Specify the auto-discharge function and the start-up sequence control.

(A) Auto-discharge function not included

(B) Auto-discharge function included

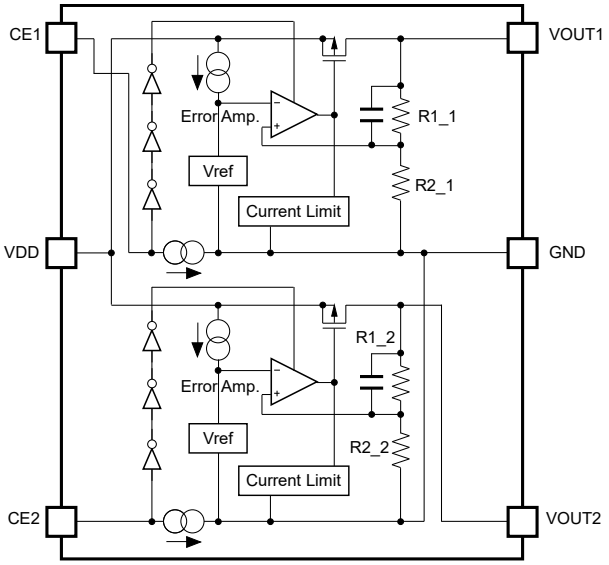
(C) Start-up sequence control and Auto-discharge function included

[1] Auto-discharge function quickly lowers the output voltage to 0 V by releasing the electrical charge accumulated in the external capacitor when the chip enable signal is switched from the active mode to the standby mode.

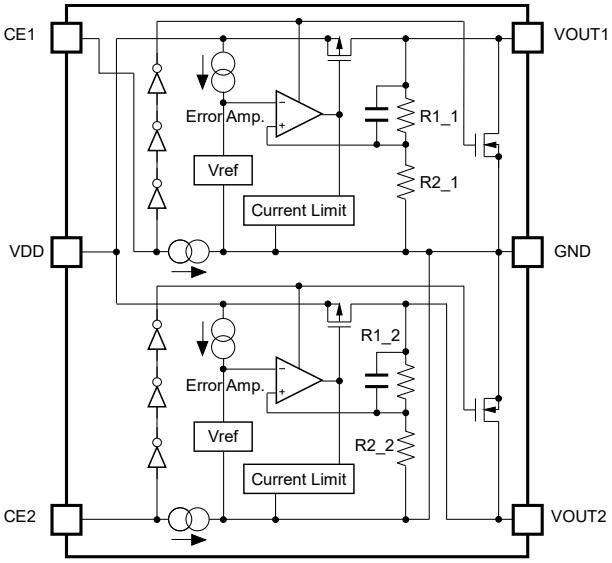


Downloaded from Arrow.com.

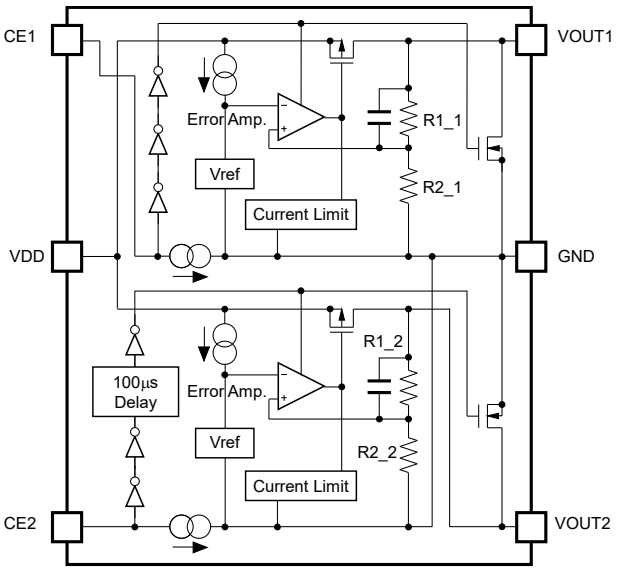
# BLOCK DIAGRAMS




**RP152xxxxA Block Diagram**




**RP152xxxxB Block Diagram**

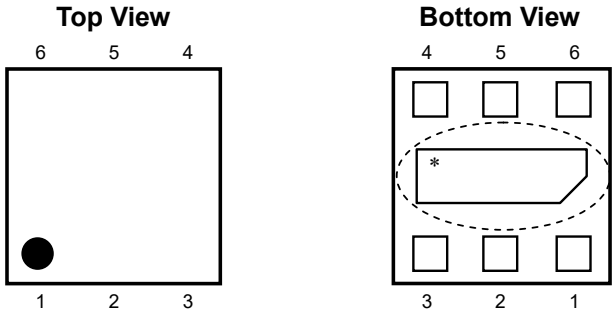



**RP152xxxxC Block Diagram**

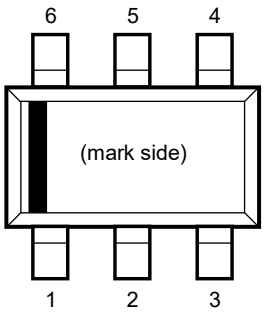


Downloaded from Arrow.com.

# PIN DESCRIPTIONS




DFN1212-6 Pin Configuration




SOT-23-6 Pin Configuration

**DFN1212-6 Pin Description**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | VOUT1 | Output Pin 1 |
| 2 | VOUT2 | Output Pin2 |
| 3 | GND | Ground Pin |
| 4 | CE2 | Chip Enable Pin 2, Active-high |
| 5 | VDD | Input Pin |
| 6 | CE1 | Chip Enable Pin 1, Active-high |

∗ The tab on the bottom of the package enhances thermal performance and is electrically connected to GND (substrate level). It is recommended that the tab be connected to the ground plane on the board, or otherwise be left floating.

**SOT-23-6 Pin Description**

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | CE1 | Chip Enable Pin 1, Active-high |
| 2 | VDD | Input Pin |
| 3 | CE2 | Chip Enable Pin 2, Active-high |
| 4 | VOUT2 | Output Pin2 |
| 5 | GND | Ground Pin |
| 6 | VOUT1 | Output Pin 1 |



Downloaded from Arrow.com.

# ABSOLUTE MAXIMUM RATINGS

**Absolute Maximum Ratings**

| Symbol | Item | Rating | | Unit |
|---|---|---|---|---|
| $V_{IN}$ | Input Voltage | −0.3 to 6.0 | | V |
| $V_{CE}$ | CE Pin Input Voltage | −0.3 to 6.0 | | V |
| $V_{OUT1}$<br>$V_{OUT2}$ | Output Voltage | −0.3 to $V_{IN}$+0.3 | | V |
| $I_{OUT1}$<br>$I_{OUT2}$ | Output Current | 180 | | mA |
| $P_D$ | Power Dissipation (Standard Land Pattern)[1] | DFN1212-6 | 600 | mW |
| | | SOT-23-6 | 420 | |
| Tj | Junction Temperature | −40 to 125 | | °C |
| Tstg | Storage Temperature Range | −55 to 125 | | °C |

**ABSOLUTE MAXIMUM RATINGS**

Electronic and mechanical stress momentarily exceeded absolute maximum ratings may cause the permanent damages and may degrade the life time and safety for both device and system using the device in the field. The functional operation at or over these absolute maximum ratings is not assured.

# RECOMMENDED OPERATING CONDITIONS

**Recommended Operating Conditions**

| Symbol | Item | Rating | Unit |
|---|---|---|---|
| $V_{IN}$ | Input Voltage[2] | 1.40 to 5.25 | V |
| Ta | Operating Temperature Range | −40 to 85 | °C |

**RECOMMENDED OPERATING CONDITIONS**

All of electronic equipment should be designed that the mounted semiconductor devices operate within the recommended operating conditions. The semiconductor devices cannot operate normally over the recommended operating conditions, even if when they are used over such conditions by momentary electronic noise or surge. And the semiconductor devices may receive serious damage when they continue to operate over the recommended operating conditions.

[1] Refer to *POWER DISSIPATION* in *SUPPLEMENTARY ITEMS* for detailed information.
[2] In case of operating the device beyond 5.25 V, do not exceed 5.5 V with 500 total operating hours.



Downloaded from Arrow.com.

# ELECTRICAL CHARACTERISTICS

$V_{IN}$ = $V_{SET}$ + 1.0 V ($V_{SET}$ > 1.5 V), $V_{IN}$ = 2.5 V ($V_{SET}$ ≤ 1.5 V), $I_{OUT}$ = 1 mA, $C_{IN}$ = $C_{OUT}$ = 0.22 µF, unless otherwise noted.

The specifications surrounded by ▭ are guaranteed by Design Engineering at −40°C ≤ Ta ≤ 85°C.

**RP152x Electrical Characteristics** (Ta = 25°C)

| Symbol | Item | Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $V_{OUT}$ | Output Voltage | Ta = 25°C | $V_{SET}$ > 2.0 V | ×0.99 | | ×1.01 | V |
| | | | $V_{SET}$ ≤ 2.0 V | −20 | | 20 | mV |
| | | −40°C ≤ Ta ≤ 85°C | $V_{SET}$ > 2.0 V | ×0.97 | | ×1.03 | V |
| | | | $V_{SET}$ ≤ 2.0 V | −60 | | 60 | mV |
| $I_{OUT}$ | Output Current | | | 150 | | | mA |
| $\Delta V_{OUT}$ /$\Delta I_{OUT}$ | Load Regulation | 1 mA ≤ $I_{OUT}$ ≤ 150 mA | | **Refer to *Product-specific Electrical Characteristics*** | | | |
| $V_{DIF}$ | Dropout Voltage | $I_{OUT}$ = 150 mA | | | | | |
| $I_{SS}$ | Supply Current | $I_{OUT}$ = 0 mA | | | 40 | 60 | µA |
| Istandby | Standby Current | $V_{CE}$ = 0 V | | | 0.1 | 1.0 | µA |
| $\Delta V_{OUT}$ /$\Delta V_{IN}$ | Line Regulation | $V_{SET}$ + 0.5 V ≤ $V_{IN}$ ≤ 5.0 V | | | 0.02 | 0.10 | %/V |
| RR | Ripple Rejection | f = 1 kHz, Ripple 0.2 Vp-p<br>$V_{IN}$ = $V_{SET}$ + 1.0 V, $I_{OUT}$ = 30 mA<br>Notes: $V_{IN}$ = 3.0 V when $V_{SET}$ ≤ 2.0 V | | | 70 | | dB |
| $\Delta V_{OUT}$ /$\Delta$Ta | Output Voltage Temperature Coefficient | −40°C ≤ Ta ≤ 85°C | | | ±80 | | ppm /°C |
| $I_{SC}$ | Short Current Limit | $V_{SET}$ = 0 V | | | 40 | | mA |
| $I_{PD}$ | CE Pull-down Current | | | | 0.3 | | µA |
| $V_{CEH}$ | CE Input Voltage "H" | | | 1.0 | | | V |
| $V_{CEL}$ | CE Input Voltage "L" | | | | | 0.4 | V |
| en | Output Noise | BW = 10 Hz to 100 kHz | | | 60 | | µVrms |
| $R_{LOW}$ | Low Output Nch Tr. ON Resistance (RP152xxxxB/C) | $V_{IN}$ = 4.0 V, $V_{CE}$ = 0 V | RP152xxxxC (VR2) | | 10 | | Ω |
| | | | Others | | 50 | | |

All test items listed under *ELECTRICAL CHARACTERISTICS* are done under the pulse load condition (Tj ≈Ta = 25°C) except for Output Noise, Ripple Rejection and Output Voltage Temperature Coefficient.



Downloaded from Arrow.com.

**Product-specific Electrical Characteristics VOUT1**

| Product Name | $V_{OUT1}$ (Ta = 25°C) | | | $V_{OUT1}$ (−40°C ≤ Ta ≤ 85°C) | | | $\Delta V_{OUT1}/\Delta I_{OUT}$ | | $V_{DIF1}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Typ. | Max. | Typ. | Max. |
| RP152x001x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x002x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x003x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x004x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x005x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x006x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x007x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x008x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x009x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x010x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x011x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x012x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x013x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x014x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x015x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x016x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x017x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x018x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x019x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x020x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x021x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x022x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x023x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x024x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x025x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x026x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x027x | 2.277 | 2.300 | 2.323 | 2.231 | 2.300 | 2.369 | 15 | 60 | 0.230 | 0.390 |
| RP152x028x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x029x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x030x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x031x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x032x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x033x | 3.069 | 3.100 | 3.131 | 3.007 | 3.100 | 3.193 | 15 | 60 | 0.190 | 0.320 |
| RP152x034x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x035x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x036x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x037x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x038x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x039x | 2.079 | 2.100 | 2.121 | 2.037 | 2.100 | 2.163 | 15 | 60 | 0.230 | 0.390 |
| RP152x040x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |



Downloaded from Arrow.com.

**Product-specific Electrical Characteristics VOUT1 (continued)**

| Product Name | $V_{OUT1}$ (Ta = 25°C) | | | $V_{OUT1}$ (−40°C ≤ Ta ≤ 85°C) | | | $\Delta V_{OUT1}/\Delta I_{OUT}$ | | $V_{DIF1}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Typ. | Max. | Typ. | Max. |
| RP152x041x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x042x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x043x | 1.280 | 1.300 | 1.320 | 1.240 | 1.300 | 1.360 | 15 | 50 | 0.390 | 0.620 |
| RP152x044x | 1.080 | 1.100 | 1.120 | 1.040 | 1.100 | 1.160 | 15 | 50 | 0.440 | 0.720 |
| RP152x045x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x046x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x047x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x048x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x049x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x050x | 2.376 | 2.400 | 2.424 | 2.328 | 2.400 | 2.472 | 15 | 60 | 0.230 | 0.390 |
| RP152x051x | 0.980 | 1.000 | 1.020 | 0.940 | 1.000 | 1.060 | 10 | 40 | 0.440 | 0.720 |
| RP152x052x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x053x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x054x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x055x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x056x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x057x | 3.069 | 3.100 | 3.131 | 3.007 | 3.100 | 3.193 | 15 | 60 | 0.190 | 0.320 |
| RP152x058x | 0.880 | 0.900 | 0.920 | 0.840 | 0.900 | 0.960 | 10 | 40 | 0.500 | 0.800 |
| RP152x059x | 2.871 | 2.900 | 2.929 | 2.813 | 2.900 | 2.987 | 15 | 60 | 0.200 | 0.350 |
| RP152x060x | 1.180 | 1.200 | 1.212 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x061x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x062x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |



Downloaded from Arrow.com.

**Product-specific Electrical Characteristics VOUT2**

| Product Name | $V_{OUT2}$ (Ta = 25°C) | | | $V_{OUT2}$ (−40°C ≤ Ta ≤ 85°C) | | | $\Delta V_{OUT2}/\Delta I_{OUT}$ | | $V_{DIF2}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Typ. | Max. | Typ. | Max. |
| RP152x001x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x002x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x003x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x004x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x005x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x006x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x007x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x008x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x009x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x010x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x011x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x012x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x013x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x014x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x015x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x016x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x017x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x018x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x019x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x020x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x021x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x022x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x023x | 2.475 | 2.500 | 2.525 | 2.425 | 2.500 | 2.575 | 15 | 60 | 0.200 | 0.350 |
| RP152x024x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x025x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x026x | 3.069 | 3.100 | 3.131 | 3.007 | 3.100 | 3.193 | 15 | 60 | 0.190 | 0.320 |
| RP152x027x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x028x | 0.980 | 1.000 | 1.020 | 0.940 | 1.000 | 1.060 | 10 | 40 | 0.440 | 0.720 |
| RP152x029x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x030x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x031x | 2.673 | 2.700 | 2.727 | 2.619 | 2.700 | 2.781 | 15 | 60 | 0.200 | 0.350 |
| RP152x032x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x033x | 3.069 | 3.100 | 3.131 | 3.007 | 3.100 | 3.193 | 15 | 60 | 0.190 | 0.320 |
| RP152x034x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x035x | 1.180 | 1.200 | 1.220 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x036x | 2.871 | 2.900 | 2.929 | 2.813 | 2.900 | 2.987 | 15 | 60 | 0.200 | 0.350 |
| RP152x037x | 1.980 | 2.000 | 2.020 | 1.940 | 2.000 | 2.060 | 15 | 60 | 0.270 | 0.460 |
| RP152x038x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x039x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x040x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |



Downloaded from Arrow.com.

**Product-specific Electrical Characteristics VOUT2 (continued)**

| Product Name | $V_{OUT2}$ (Ta = 25°C) | | | $V_{OUT2}$ (−40°C ≤ Ta ≤ 85°C) | | | $\Delta V_{OUT2}/\Delta I_{OUT}$ | | $V_{DIF2}$ | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Typ. | Max. | Typ. | Max. |
| RP152x041x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x042x | 2.574 | 2.600 | 2.626 | 2.522 | 2.600 | 2.678 | 15 | 60 | 0.200 | 0.350 |
| RP152x043x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x044x | 1.480 | 1.500 | 1.520 | 1.440 | 1.500 | 1.560 | 15 | 50 | 0.310 | 0.550 |
| RP152x045x | 3.267 | 3.300 | 3.333 | 3.201 | 3.300 | 3.399 | 15 | 60 | 0.190 | 0.320 |
| RP152x046x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x047x | 2.772 | 2.800 | 2.828 | 2.716 | 2.800 | 2.884 | 15 | 60 | 0.200 | 0.350 |
| RP152x048x | 3.168 | 3.200 | 3.232 | 3.104 | 3.200 | 3.296 | 15 | 60 | 0.190 | 0.320 |
| RP152x049x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x050x | 2.871 | 2.900 | 2.929 | 2.813 | 2.900 | 2.987 | 15 | 60 | 0.200 | 0.350 |
| RP152x051x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x052x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x053x | 2.673 | 2.700 | 2.727 | 2.619 | 2.700 | 2.781 | 15 | 60 | 0.200 | 0.350 |
| RP152x054x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x055x | 2.822 | 2.850 | 2.879 | 2.765 | 2.850 | 2.936 | 15 | 60 | 0.200 | 0.350 |
| RP152x056x | 2.970 | 3.000 | 3.030 | 2.910 | 3.000 | 3.090 | 15 | 60 | 0.190 | 0.320 |
| RP152x057x | 1.780 | 1.800 | 1.820 | 1.740 | 1.800 | 1.860 | 15 | 55 | 0.270 | 0.460 |
| RP152x058x | 0.880 | 0.900 | 0.920 | 0.840 | 0.900 | 0.960 | 10 | 40 | 0.500 | 0.800 |
| RP152x059x | 2.871 | 2.900 | 2.929 | 2.813 | 2.900 | 2.987 | 15 | 60 | 0.200 | 0.350 |
| RP152x060x | 1.180 | 1.200 | 1.212 | 1.140 | 1.200 | 1.260 | 15 | 50 | 0.390 | 0.620 |
| RP152x061x | 2.871 | 2.900 | 2.929 | 2.813 | 2.900 | 2.987 | 15 | 60 | 0.200 | 0.350 |
| RP152x062x | 3.069 | 3.100 | 3.131 | 3.007 | 3.100 | 3.193 | 15 | 60 | 0.190 | 0.320 |

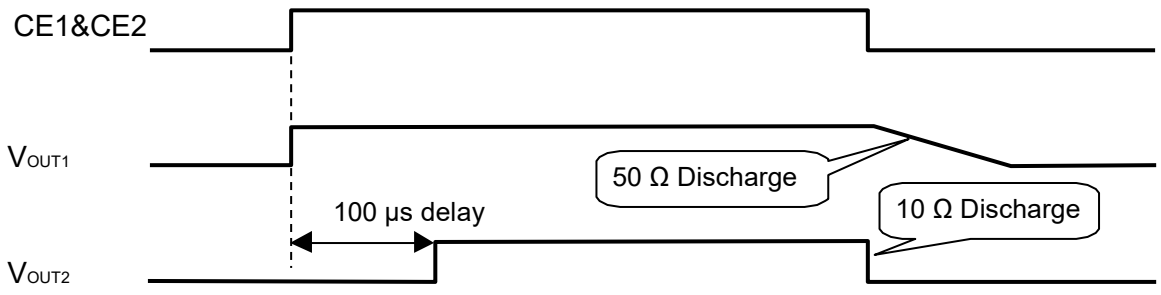


Downloaded from Arrow.com.

# THEORY OF OPERATION

## Start-up Sequence Circuit

The RP152xxxxC is equipped with a start-up sequence circuit. VR2 stands-up in 100 µs delay after VR1 stands up simultaneously with CE. Moreover, to disabling is depending upon the setting output voltage and the external capacitors. VR1 reduces the output voltage by the Nch driver of about 50 Ω, and VR2 reduces the output voltage by the Nch driver of about 10 Ω.

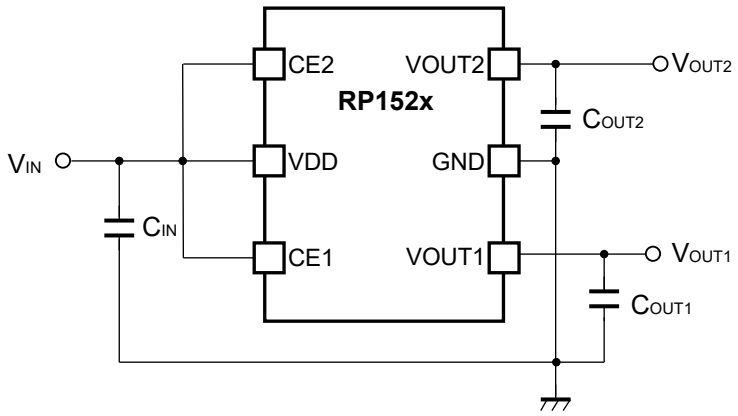



**RP152xxxxC Start-up Sequence Circuit**



Downloaded from Arrow.com.

# APPLICATION INFORMATION




**RP152x Typical Application Circuit**

**External Components**

| Symbol | Description |
|---|---|
| $C_{IN}$ | Ceramic, 0.22 µF, Murata: GRM155B31A224KE18B |
| $C_{OUT1}$ | |
| $C_{OUT2}$ | |

### Technical Notes on the Components Selection

- In this device, phase compensation is provided to secure stable operation even when the load current varied. For this purpose, connect 0.22 µF or more output capacitors ($C_{OUT1}$, $C_{OUT2}$) between the VOUT and GND pin with shortest-distance wiring. In case of using a tantalum type capacitor and the ESR (Equivalent Series Resistance) value of the capacitor is large, the output might be unstable. Evaluate the circuit including consideration of frequency characteristics.
- Ensure the VDD and GND lines are sufficiently robust. If their impedance is too high, noise pickup or unstable operation may result. Connect a 0.22 µF input capacitor ($C_{IN}$) between the VDD and GND pins with shortest-distance wiring. Refer to *Typical Application Circuit*.



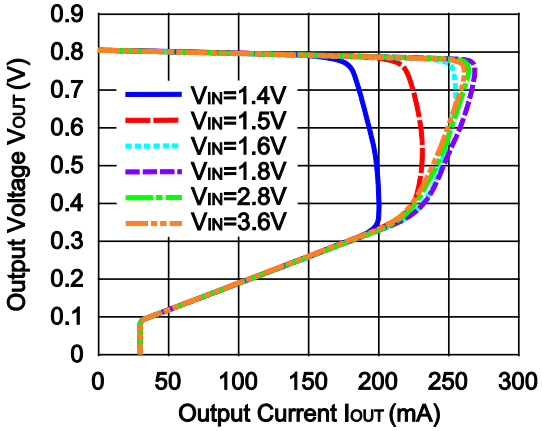
Downloaded from Arrow.com.

# TYPICAL CHARACTERISTICS

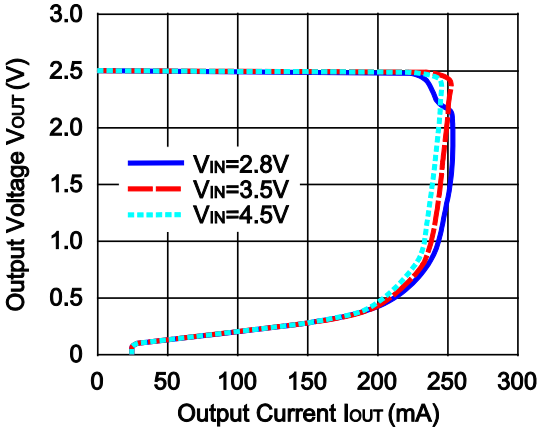
**Notes: Typical Characteristics are intended to be used as reference data; they are not guaranteed.**

**1) Output Voltage vs. Output Current (Ta = 25°C)**

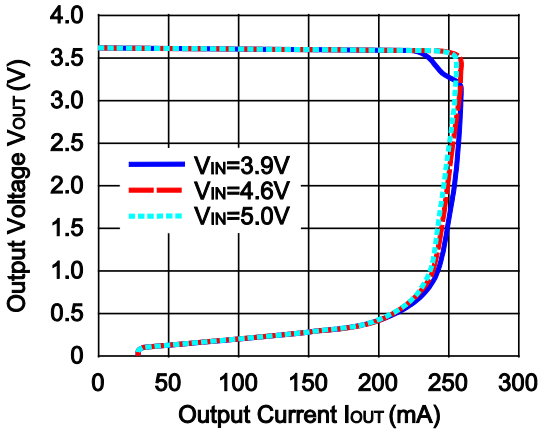
**0.8 V (VR1/ VR2)**




**2.5 V (VR1/ VR2)**

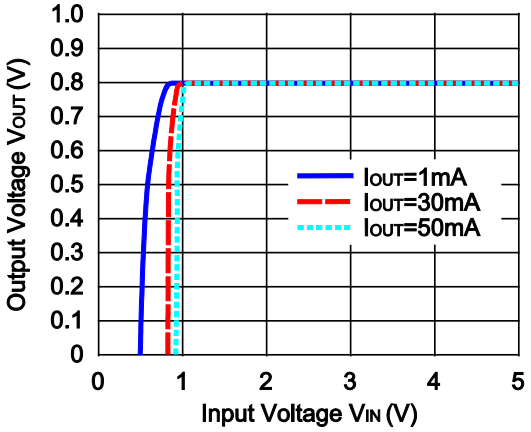



**3.6 V (VR1/ VR2)**

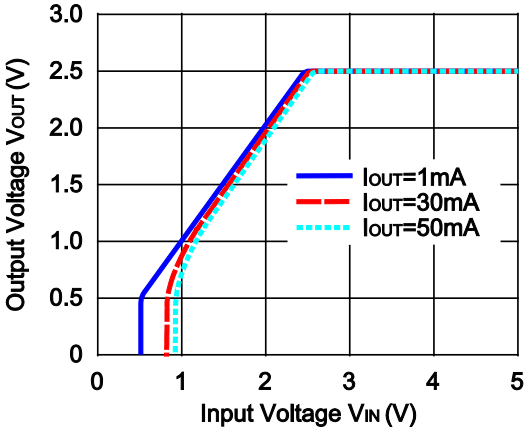



**2) Output Voltage vs. Input Voltage (Ta = 25°C)**

**0.8 V (VR1/ VR2)**

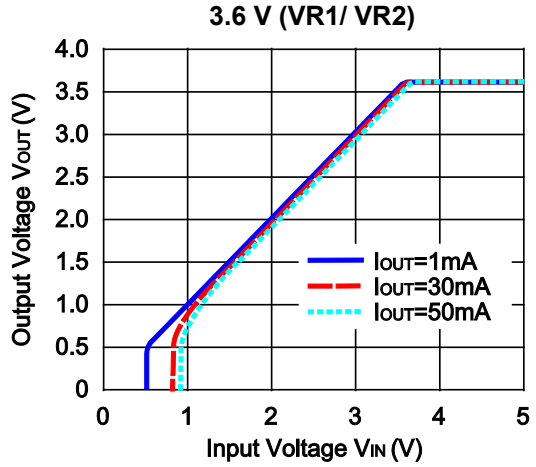



**2.5 V (VR1/ VR2)**

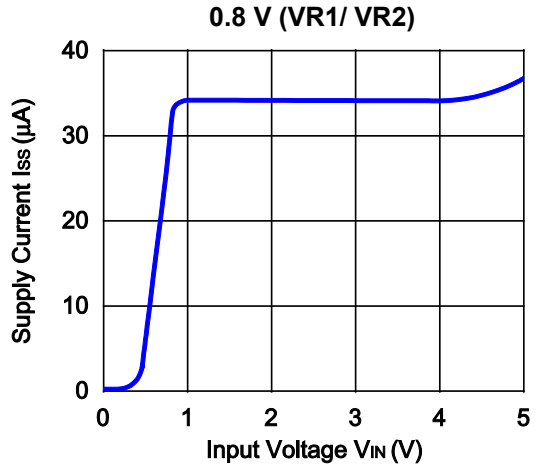


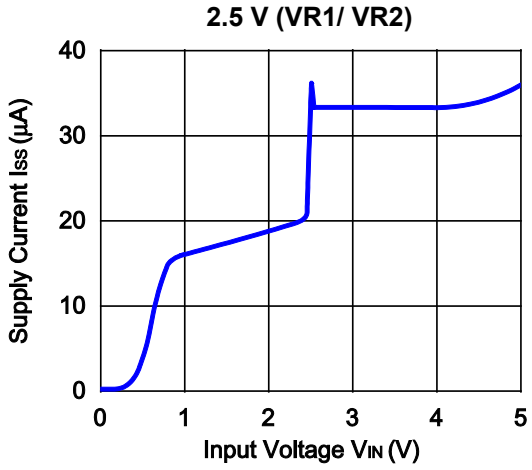


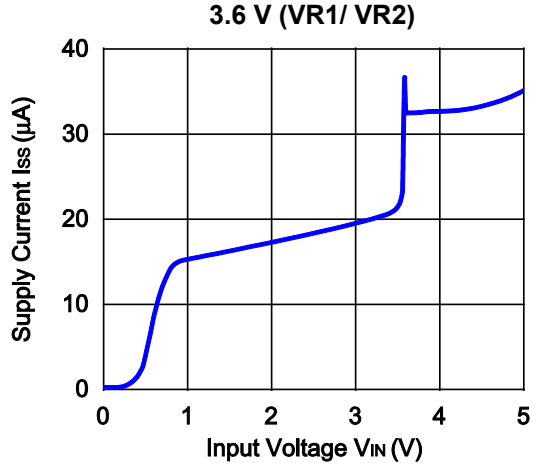

Downloaded from Arrow.com.




3) Supply Current vs. Input Voltage



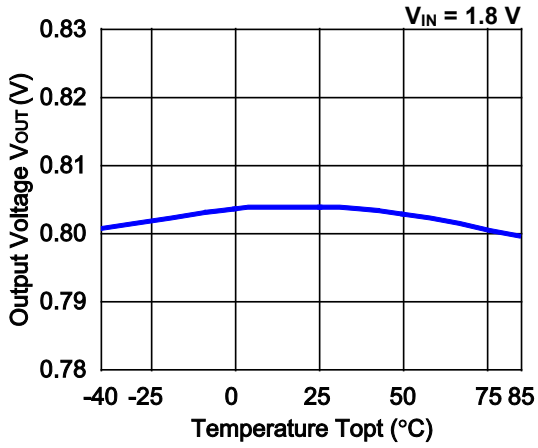





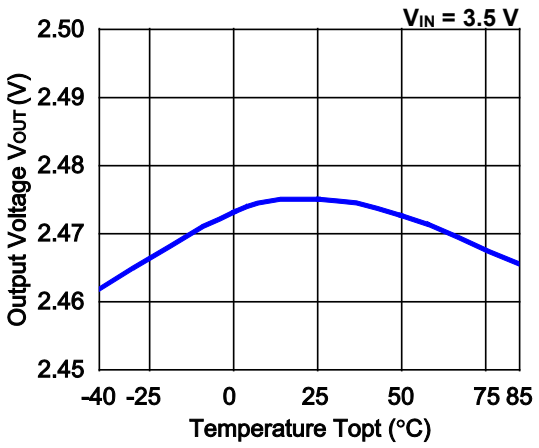

Downloaded from Arrow.com.

4) Output Voltage vs. Temperature

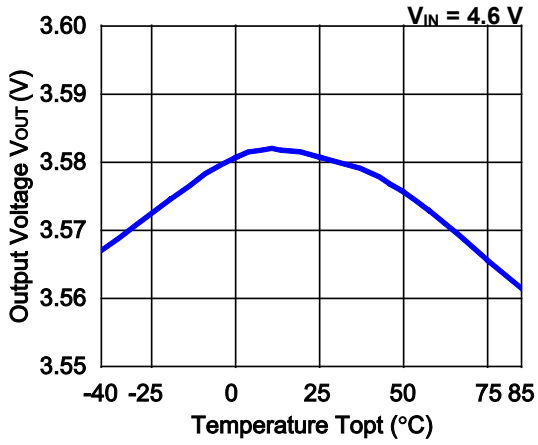
0.8 V (VR1/ VR2)




2.5 V (VR1/ VR2)

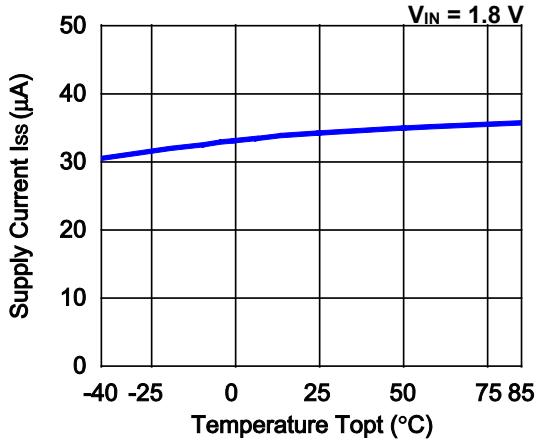



3.6 V (VR1/ VR2)

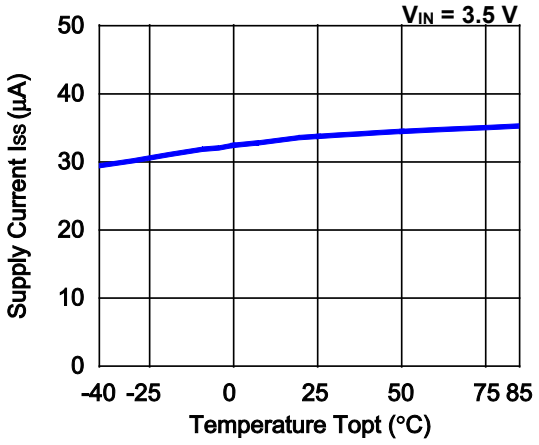



5) Supply Current vs. Temperature

0.8 V (VR1/ VR2)



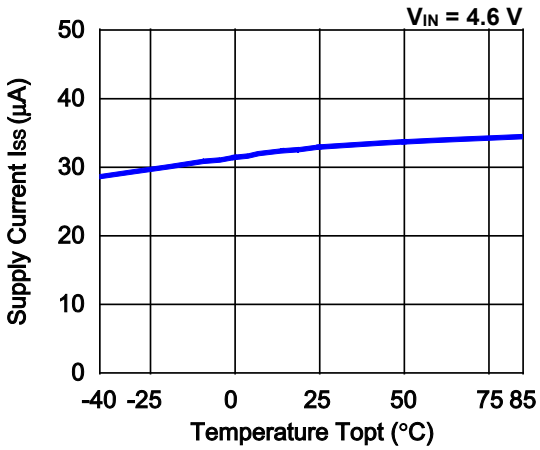

2.5 V (VR1/ VR2)





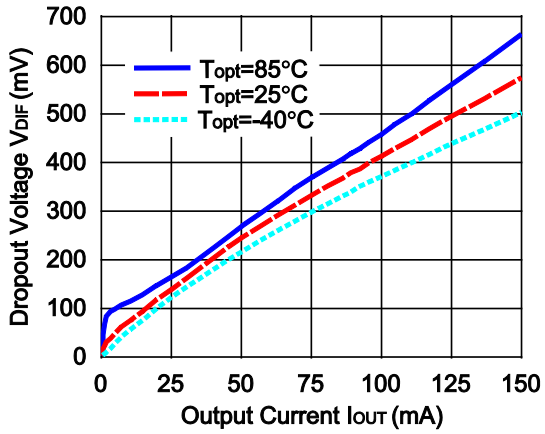

Downloaded from Arrow.com.

3.6V（VR1/VR2）

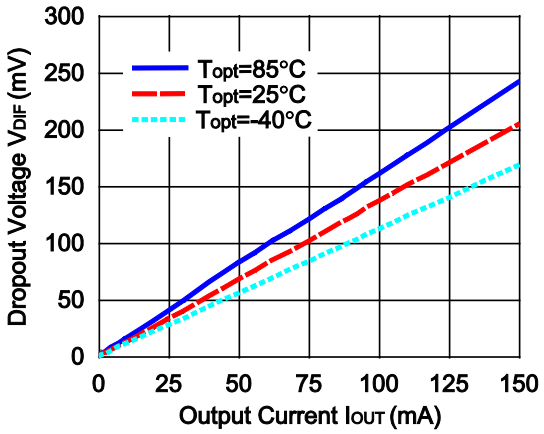



6) Dropout Voltage vs. Output Current

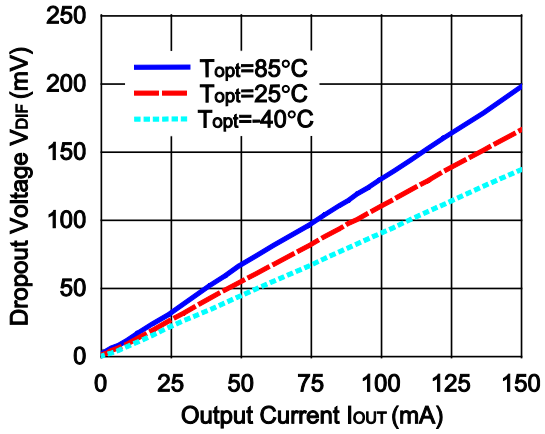
0.8 V (VR1/ VR2)




2.5 V (VR1/ VR2)



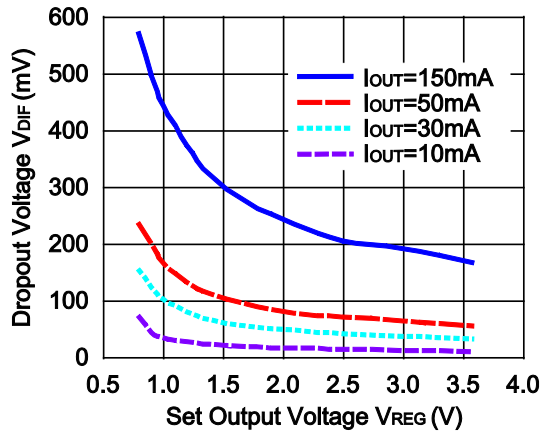

3.6 V (VR1/ VR2)





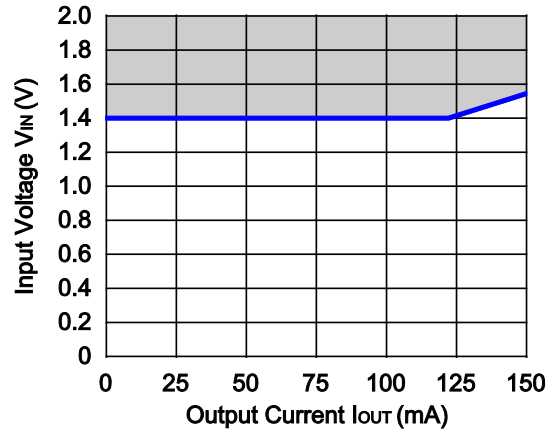

Downloaded from Arrow.com.

### 7) Dropout Voltage vs. Set Output Voltage




### 8) Minimum Operating Voltage

0.8 V (VR1/ VR2)

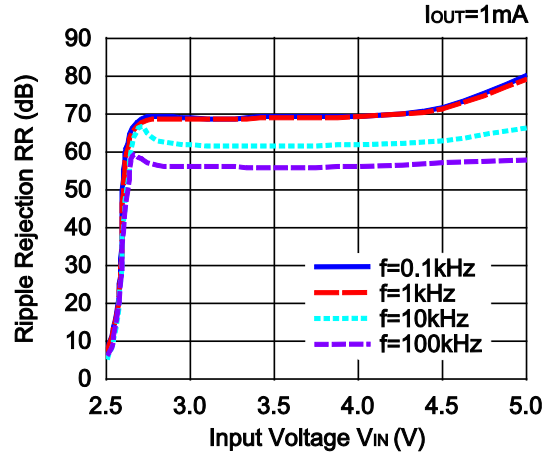



The hatched area is available for a 0.8-V output device.

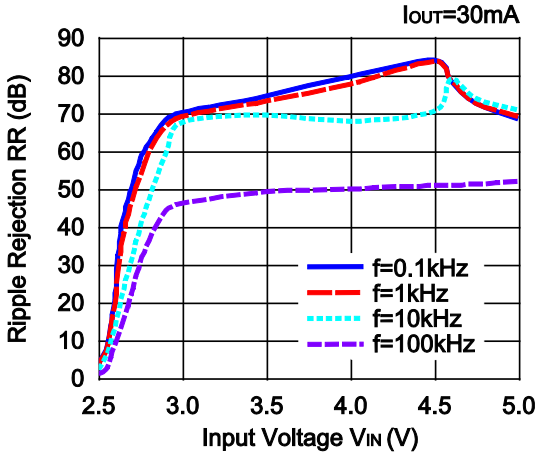
### 9) Ripple Rejection vs. Input Voltage

**($C_{IN}$ = none, $C_{OUT1}$ = $C_{OUT2}$ = Ceramic 0.22 µF, Ripple = 0.2 Vp-p, Ta = 25°C)**

2.5 V (VR1/ VR2)




2.5 V (VR1/ VR2)



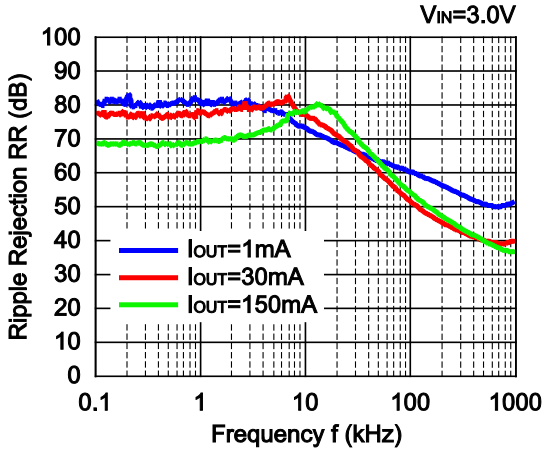



Downloaded from Arrow.com.

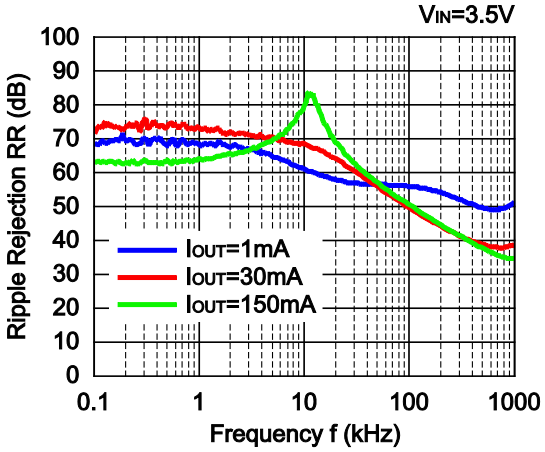
**10) Ripple Rejection vs. Frequency**

**($C_{IN}$ = none, $C_{OUT1}$ = $C_{OUT2}$ = Ceramic 0.22 µF, Ripple = 0.2 Vp-p, Ta = 25°C)**

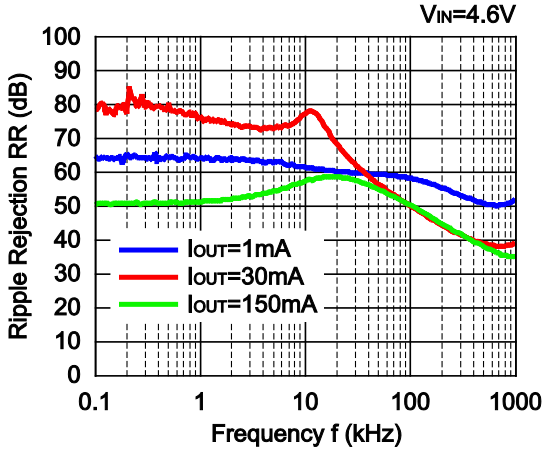
**0.8 V (VR1/ VR2)**




**2.5 V (VR1/ VR2)**



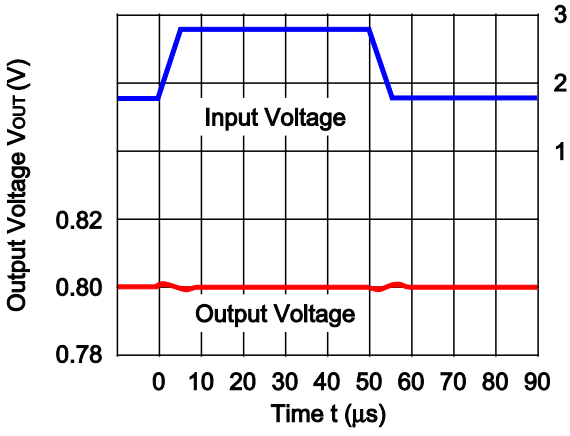

**3.6 V (VR1/ VR2)**



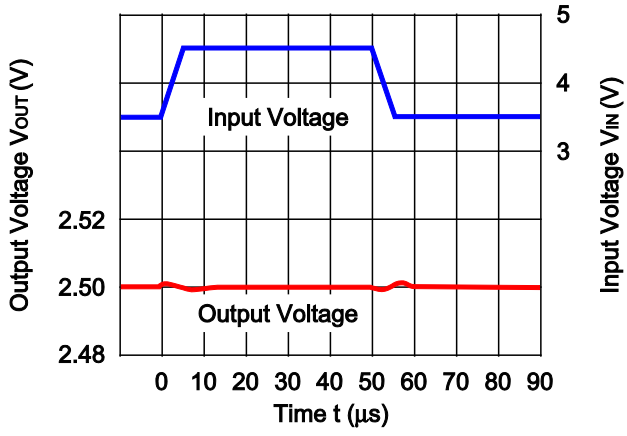

**11) Input Transient Response**

**($I_{OUT}$ = 30 mA, tr = tf = 5 µs, $C_{IN}$ = none, $C_{OUT1}$ = $C_{OUT2}$ = 0.22 µF, Ta = 25°C)**

**0.8 V (VR1/ VR2)**



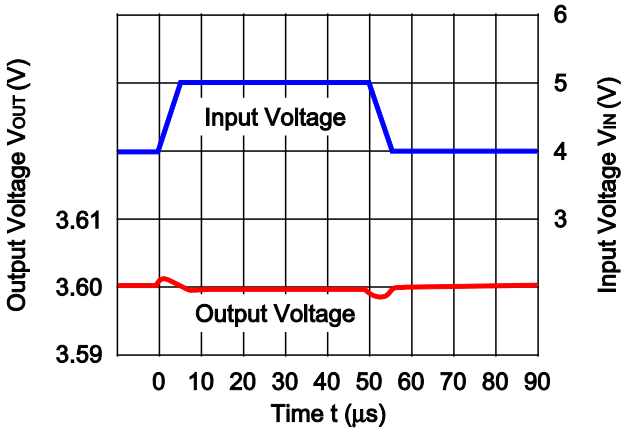

**2.5 V (VR1/ VR2)**





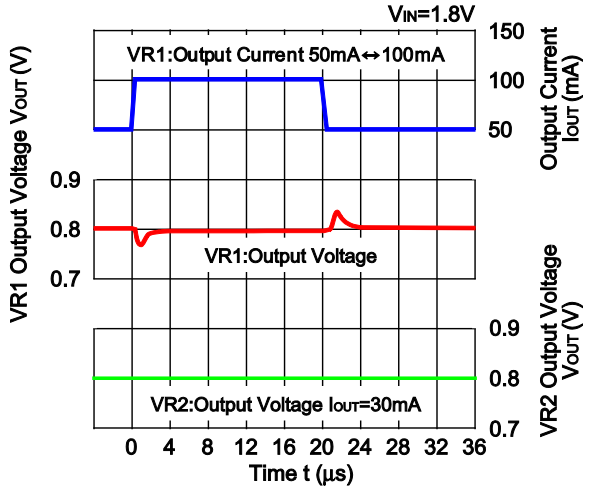

Downloaded from Arrow.com.

3.6 V (VR1/ VR2)

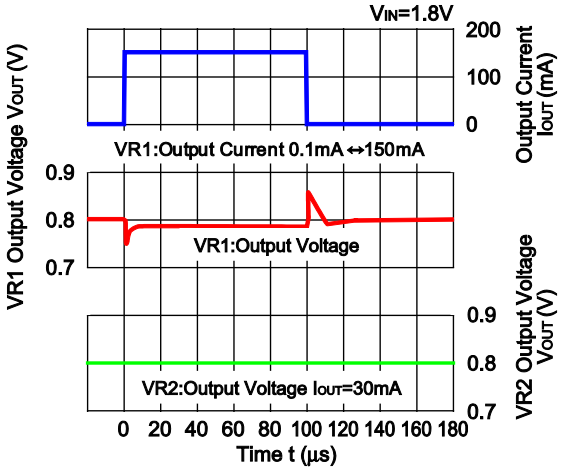



12) Load Transient Response (tr = tf = 0.5 µs, $C_{IN}$ = $C_{OUT1}$ = $C_{OUT2}$ = 0.22 µF, Ta = 25°C)

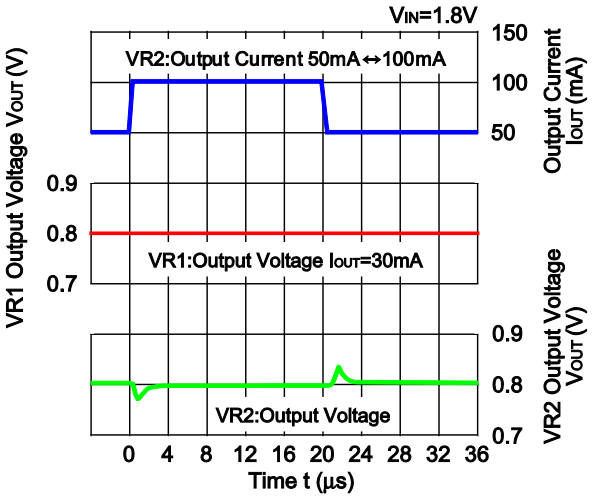
0.8 V (VR1/ VR2)



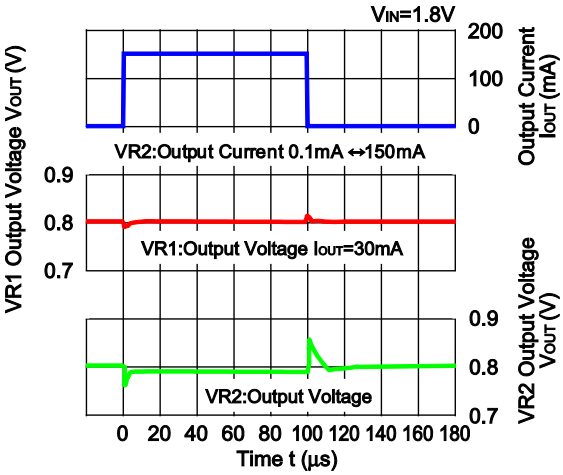

0.8 V (VR1/ VR2)




0.8 V (VR1/ VR2)



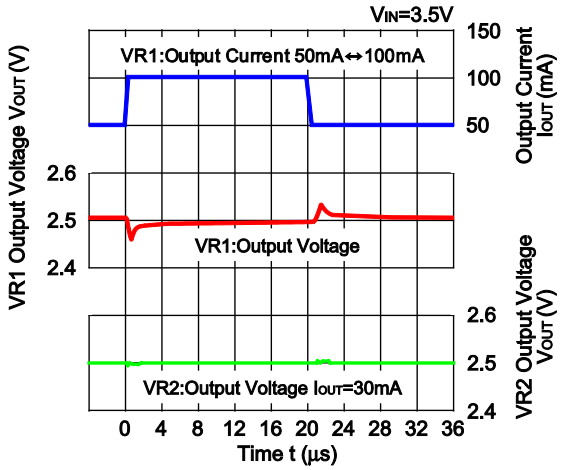

0.8 V (VR1/ VR2)



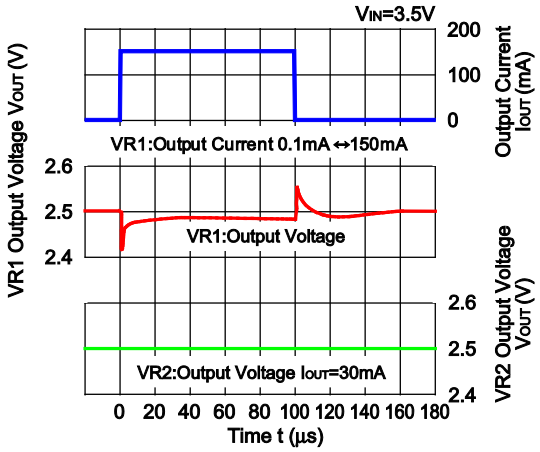



Downloaded from Arrow.com.

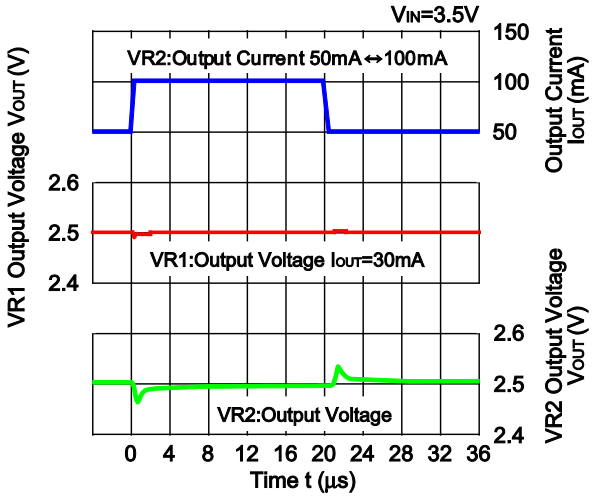
2.5 V (VR1/ VR2)



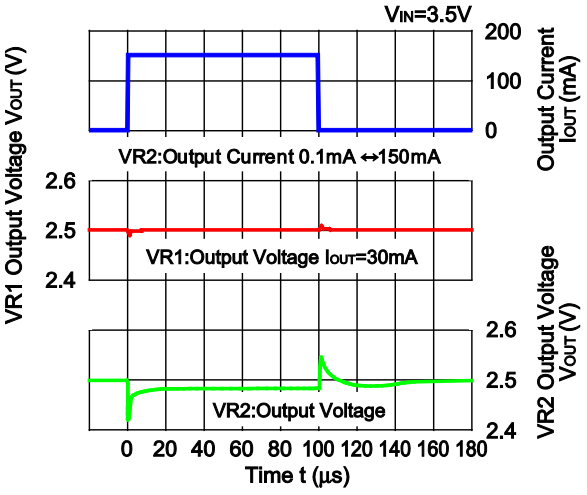

2.5 V (VR1/ VR2)



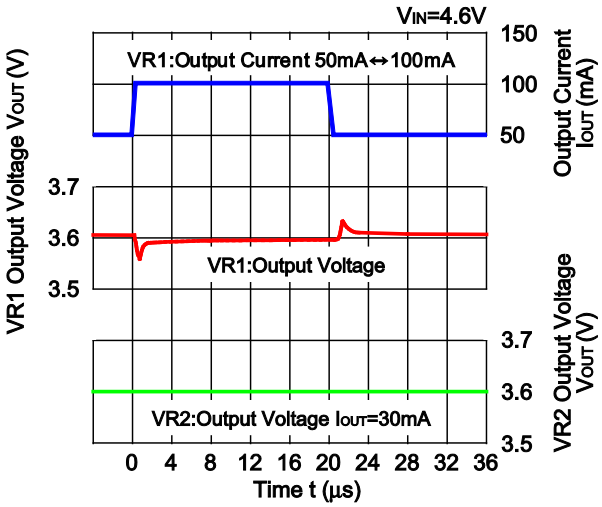

2.5 V (VR1/ VR2)



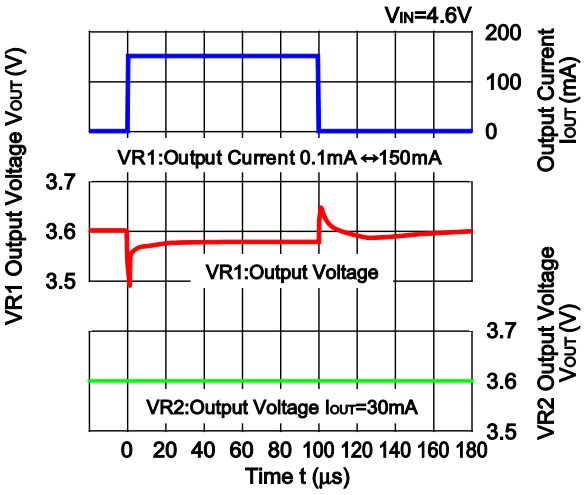

2.5 V (VR1/ VR2)




3.6 V (VR1/ VR2)



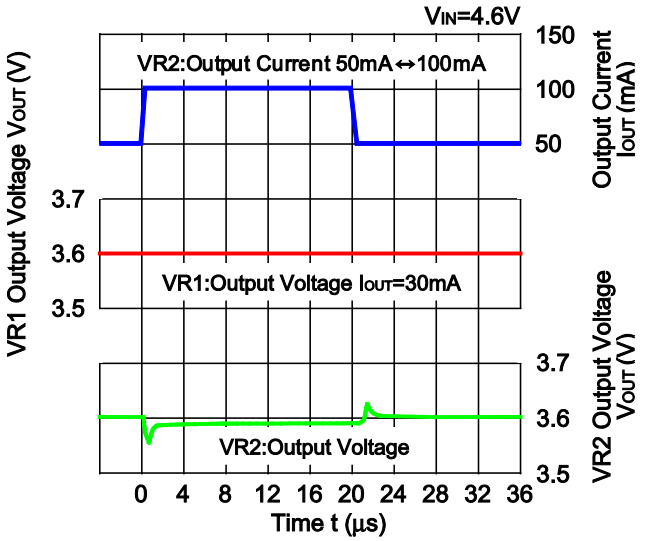

3.6 V (VR1/ VR2)



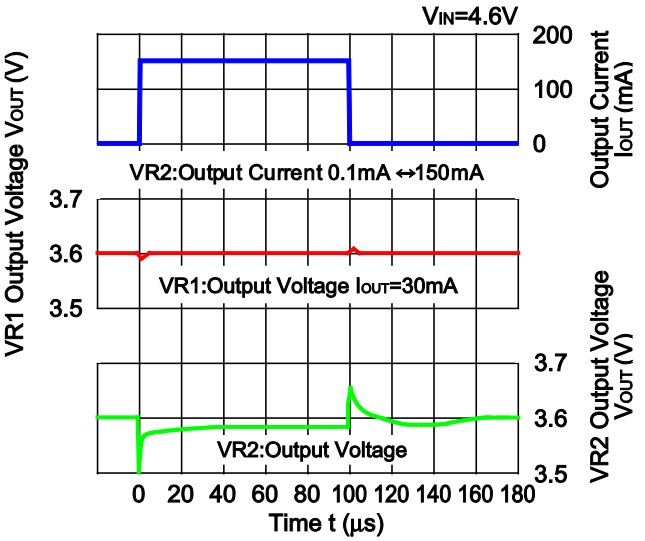



Downloaded from Arrow.com.

3.6 V (VR1/ VR2)

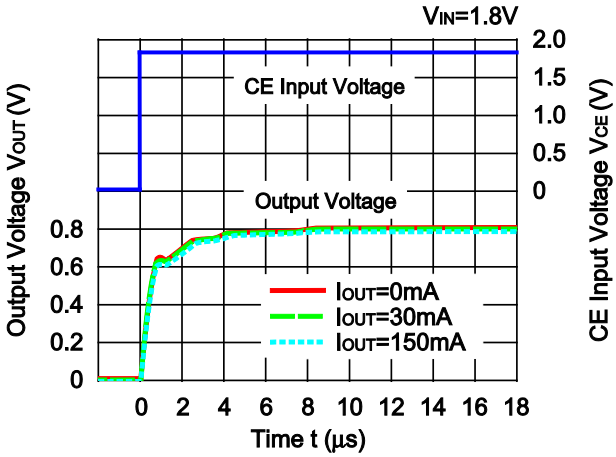



3.6 V (VR1/ VR2)

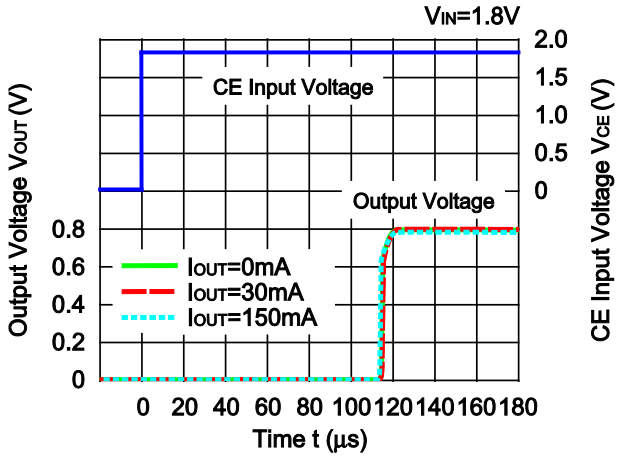



13) Turn On Speed with CE Pin ($C_{IN}$ = $C_{OUT1}$ = $C_{OUT2}$ = 0.22 µF, Ta = 25°C)

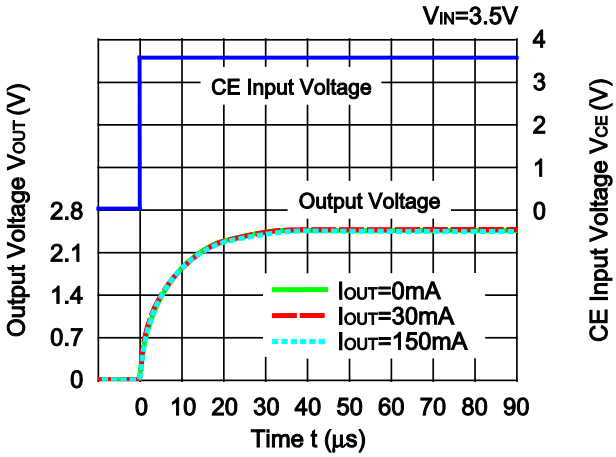
0.8 V A/B Version (VR1/ VR2), C Version (VR1)



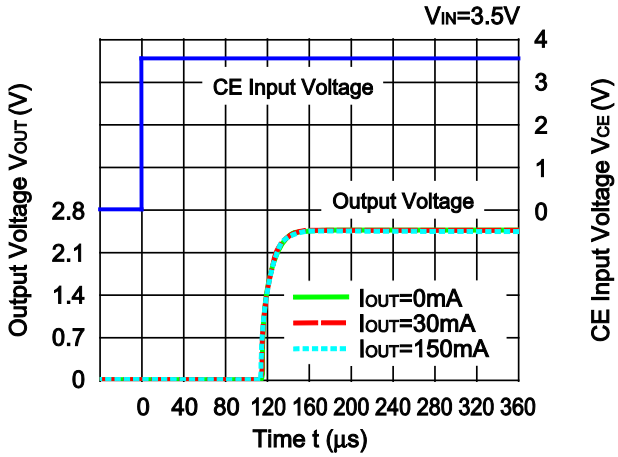

0.8 V C Version (VR2)




2.5 V A/B Version (VR1/ VR2), C Version (VR1)



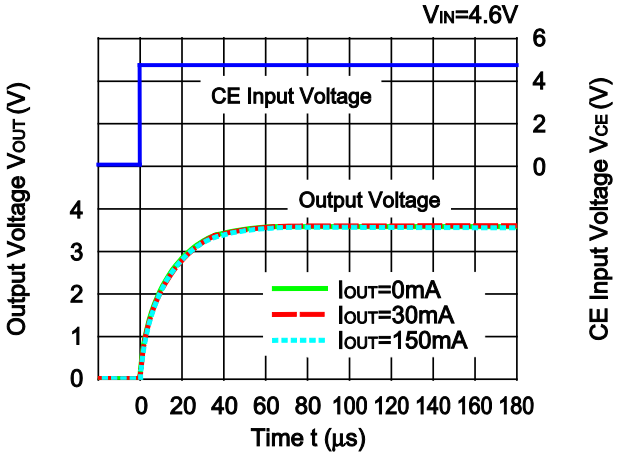

2.5 V C Version (VR2)



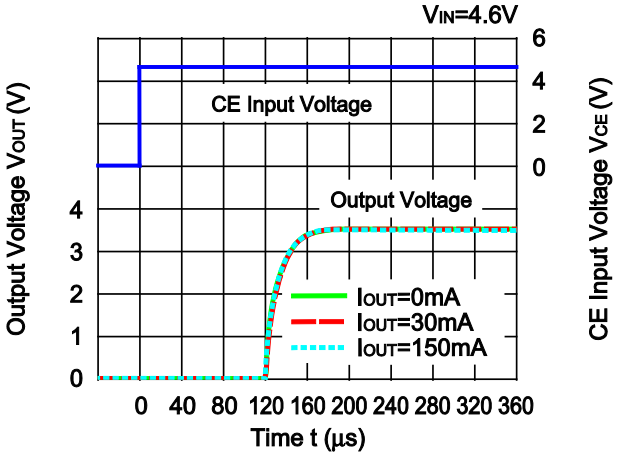



Downloaded from Arrow.com.

3.6 V A/B Version (VR1/ VR2), C Version (VR1)

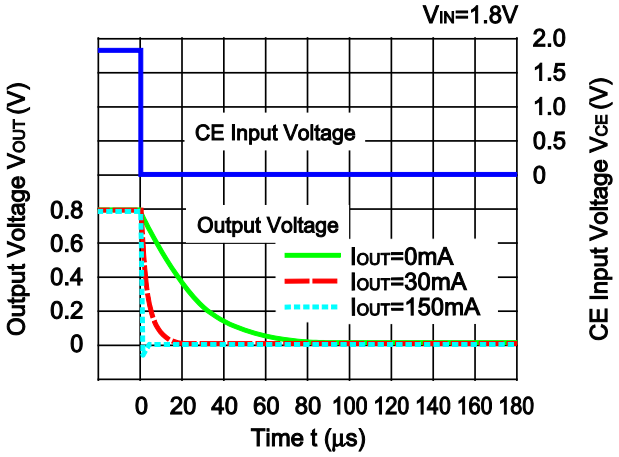



3.6 V C Version (VR2)

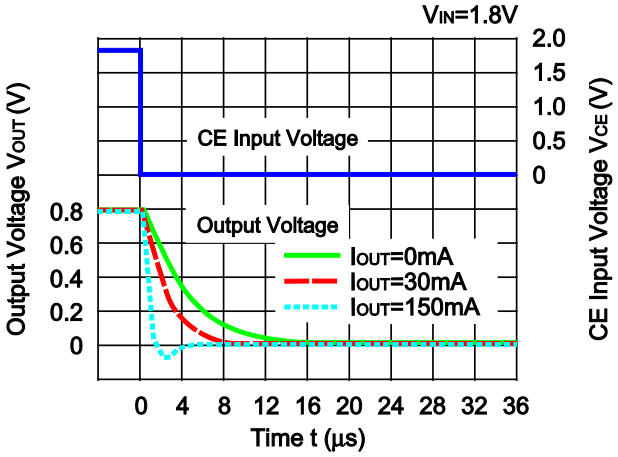



14) Tum Off Speed with CE Pin ($C_{IN}$ = $C_{OUT1}$ = $C_{OUT2}$ = 0.22 µF, Ta = 25°C)

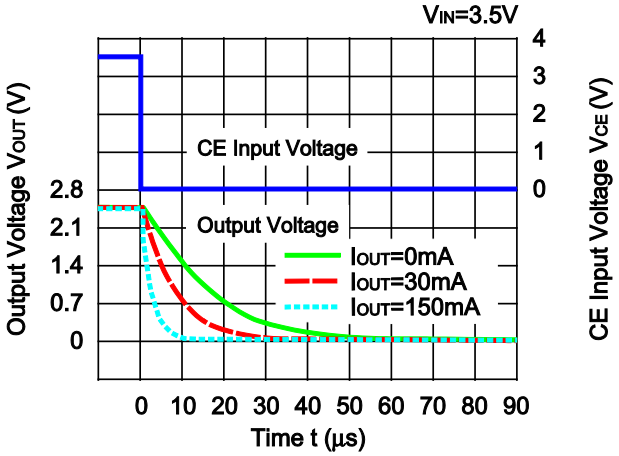
0.8 V B Version (VR1/ VR2), C Version (VR1)



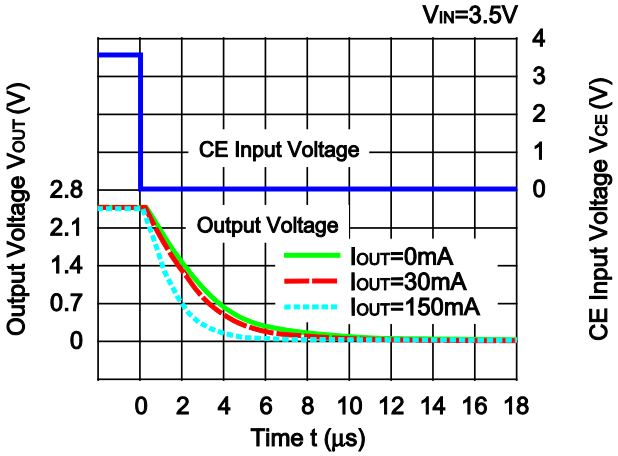

0.8 V C Version (VR2)




2.5 V B Version (VR1/ VR2), C Version (VR1)



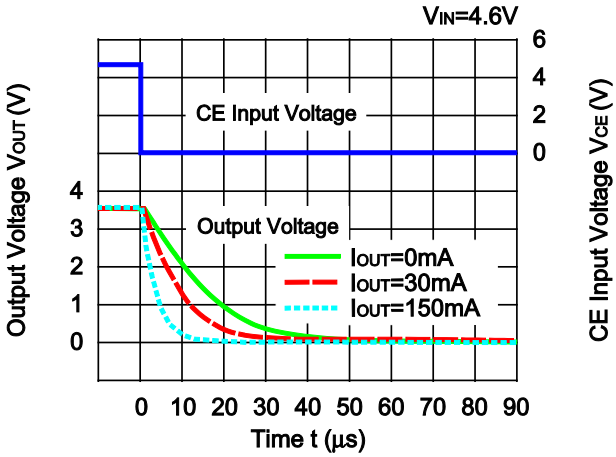

2.5 V C Version (VR2)



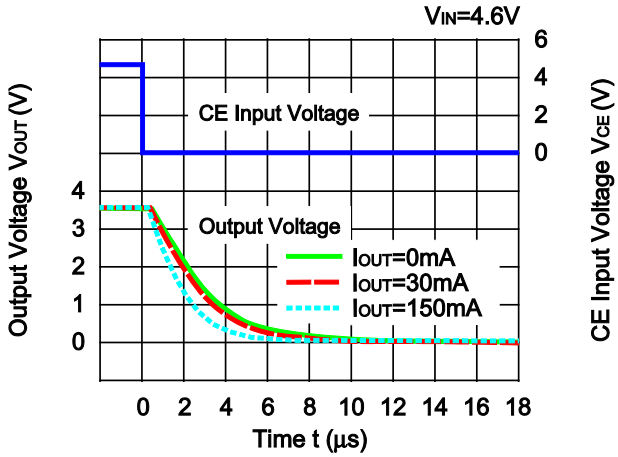



Downloaded from Arrow.com.

3.6 V B Version (VR1/ VR2), C Version (VR1)




3.6 V C Version (VR2)






Downloaded from Arrow.com.

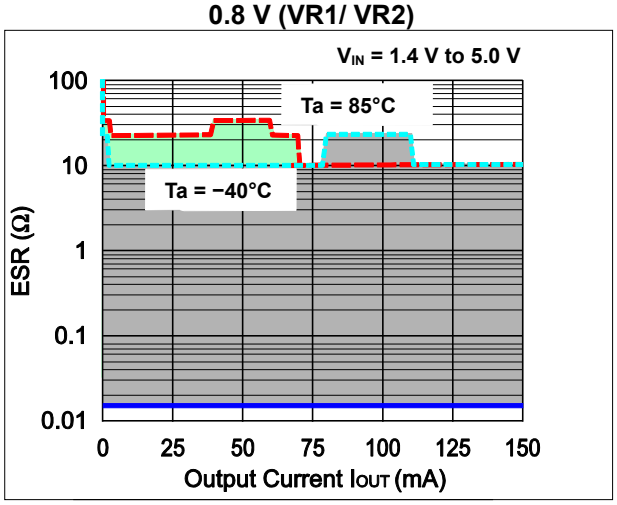
### Equivalent Series Resistance (ESR) vs. Output Current

It is recommended that a ceramic type capacitor be used for the RP152x. However, other types of capacitors having lower ESR can also be used. The relation between the output current ($I_{OUT}$) and the ESR of output capacitor is shown below.

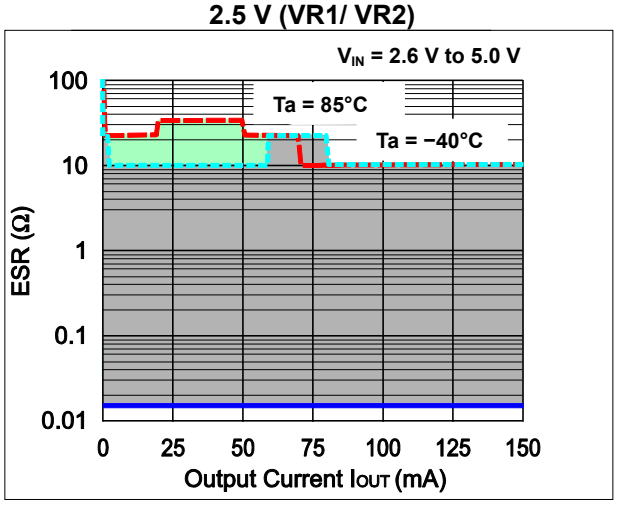
**Measurement Conditions:**

- Noise Frequency Band: 10 Hz to 2 MHz
- Measurement Temperature: −40°C to +85°C
- Hatched Area: Noise level is 40 µV (avg.) or below.
- $C_{IN}$, $C_{OUT1}$, $C_{OUT2}$: 0.22 µF (Murata: GRM155B10J224KE01)

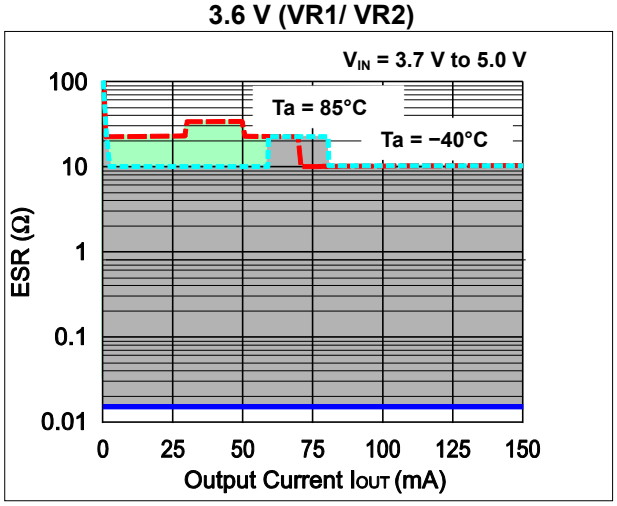
**0.8 V (VR1/ VR2)**




**2.5 V (VR1/ VR2)**




**3.6 V (VR1/ VR2)**






Downloaded from Arrow.com.

Ver. A

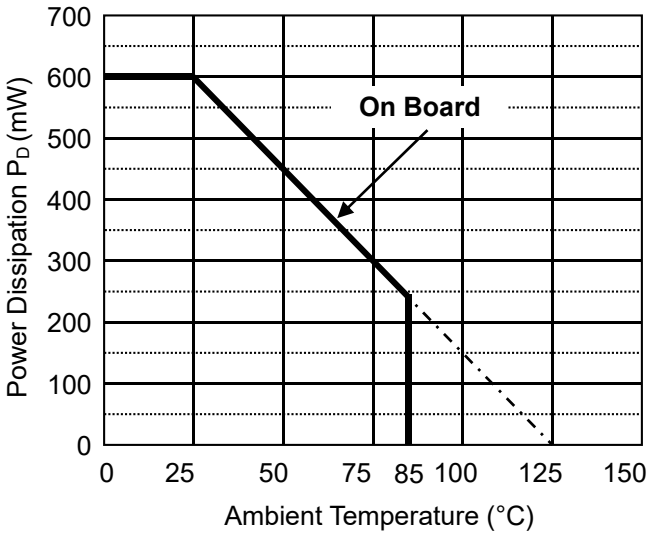
Power Dissipation ($P_D$) of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

**Measurement Conditions**

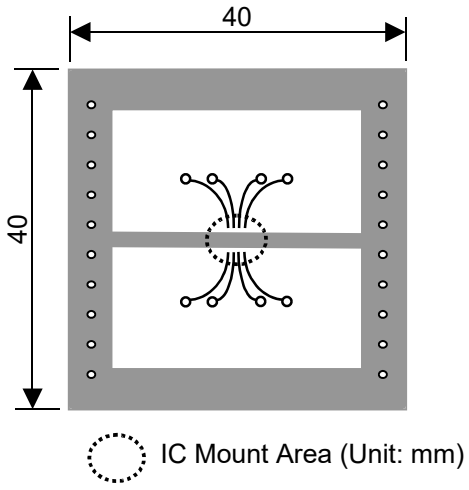
| | Standard Land Pattern |
|---|---|
| Environment | Mounting on Board (Wind Velocity = 0 m/s) |
| Board Material | Glass Cloth Epoxy Plastic (Double-sided) |
| Board Dimensions | 40 mm x 40 mm x 1.6 mm |
| Copper Ratio | Top-side: Approx. 50%, Back-side: Approx. 50% |
| Through-holes | ϕ: 0.5 mm x 28 pcs |

**Measurement Result** (Ta = 25°C, Tjmax = 125°C)

| | Standard Land Pattern |
|---|---|
| Power Dissipation | 600 mW |
| Thermal Resistance | θja = (125 − 25°C) / 0.6 W = 167°C/W |
| | θjc = 30°C/W |




**Power Dissipation vs. Ambient Temperature**



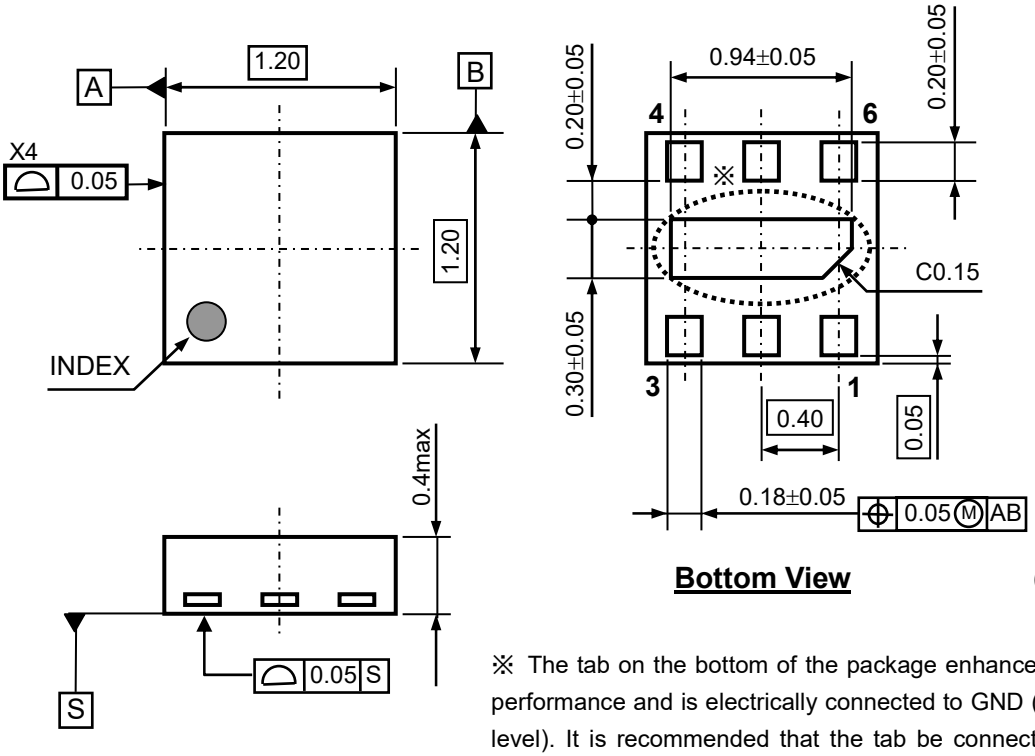

**Measurement Board Pattern**



RICOH

Downloaded from Arrow.com.

Ver. A




**Bottom View** (Unit: mm)

※ The tab on the bottom of the package enhances thermal performance and is electrically connected to GND (substrate level). It is recommended that the tab be connected to the ground plane on the board, or otherwise be left floating.

**DFN1212-6 Package Dimensions**



Downloaded from Arrow.com.

Ver. A

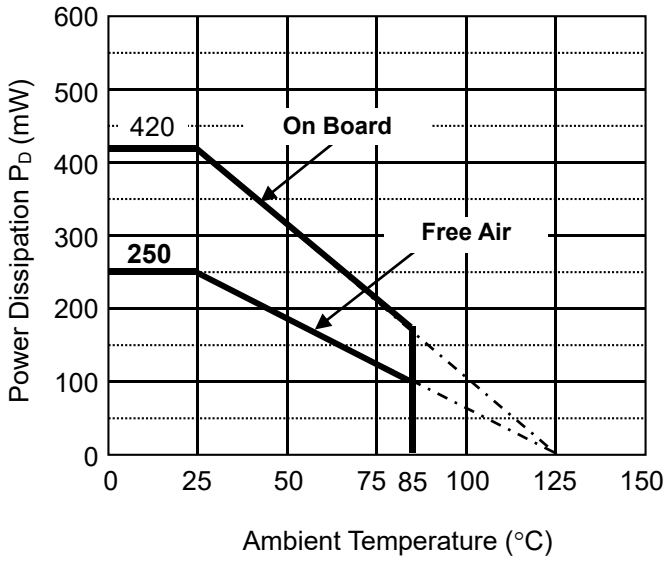
Power Dissipation ($P_D$) of the package is dependent on PCB material, layout, and environmental conditions. The following conditions are used in this measurement.

**Measurement Conditions**

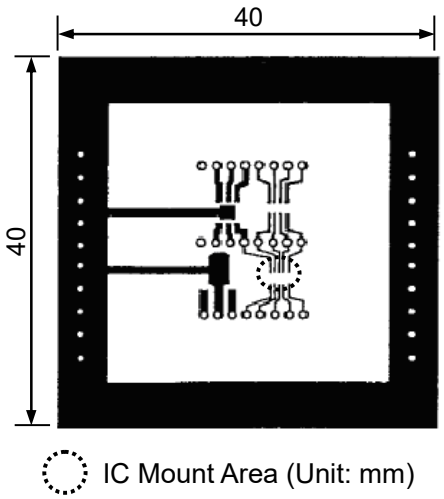
| | Standard Land Pattern |
|---|---|
| Environment | Mounting on Board (Wind Velocity = 0 m/s) |
| Board Material | Glass Cloth Epoxy Plastic (Double-sided) |
| Board Dimensions | 40 mm x 40 mm x 1.6 mm |
| Copper Ratio | Top-side: Approx. 50%, Back-side: Approx. 50% |
| Through-holes | $\phi$ 0.5 mm x 44 pcs |

**Measurement Result** (Ta = 25°C, Tjmax = 125°C)

| | Standard Land Pattern | Free Air |
|---|---|---|
| Power Dissipation | 420 mW | 250 mW |
| Thermal Resistance | $\theta$ja = (125 - 25°C) / 0.42 W = 238°C/W | 400°C/W |




**Power Dissipation (mW) vs. Temperature (°C)**



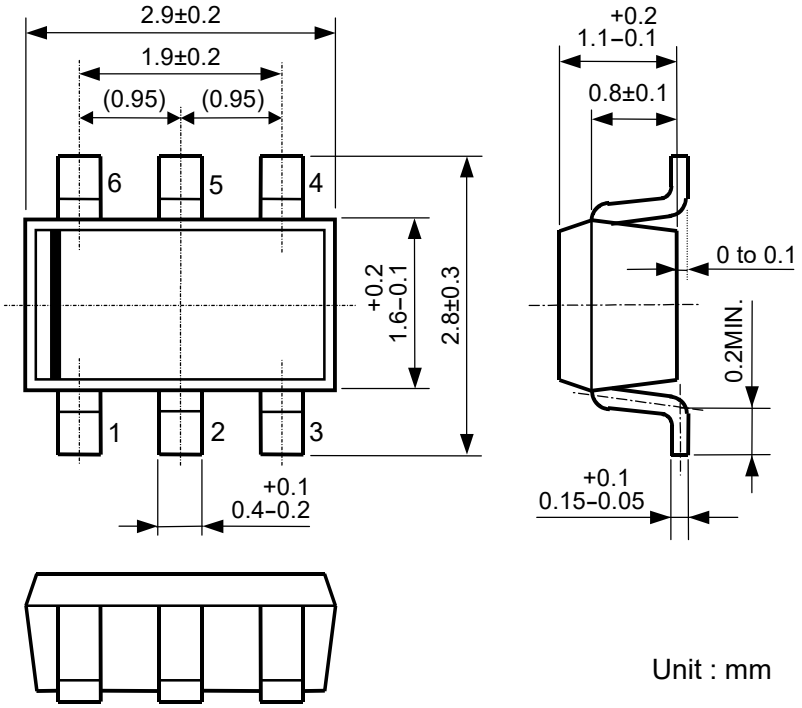

**Measurement Board Pattern**



RICOH

Downloaded from Arrow.com.

Ver. A




Unit : mm

**SOT-23-6 Package Dimensions**



RICOH

Downloaded from Arrow.com.

1. The products and the product specifications described in this document are subject to change or discontinuation of production without notice for reasons such as improvement. Therefore, before deciding to use the products, please refer to Ricoh sales representatives for the latest information thereon.
2. The materials in this document may not be copied or otherwise reproduced in whole or in part without prior written consent of Ricoh.
3. Please be sure to take any necessary formalities under relevant laws or regulations before exporting or otherwise taking out of your country the products or the technical information described herein.
4. The technical information described in this document shows typical characteristics of and example application circuits for the products. The release of such information is not to be construed as a warranty of or a grant of license under Ricoh's or any third party's intellectual property rights or any other rights.
5. The products listed in this document are intended and designed for use as general electronic components in standard applications (office equipment, telecommunication equipment, measuring instruments, consumer electronic products, amusement equipment etc.). Those customers intending to use a product in an application requiring extreme quality and reliability, for example, in a highly specific application where the failure or misoperation of the product could result in human injury or death (aircraft, spacevehicle, nuclear reactor control system, traffic control system, automotive and transportation equipment, combustion equipment, safety devices, life support system etc.) should first contact us.
6. We are making our continuous effort to improve the quality and reliability of our products, but semiconductor products are likely to fail with certain probability. In order to prevent any injury to persons or damages to property resulting from such failure, customers should be careful enough to incorporate safety measures in their design, such as redundancy feature, fire containment feature and fail-safe feature. We do not assume any liability or responsibility for any loss or damage arising from misuse or inappropriate use of the products.
7. Anti-radiation design is not implemented in the products described in this document.
8. The X-ray exposure can influence functions and characteristics of the products. Confirm the product functions and characteristics in the evaluation stage.
9. WLCSP products should be used in light shielded environments. The light exposure can influence functions and characteristics of the products under operation or storage.
10. There can be variation in the marking when different AOI (Automated Optical Inspection) equipment is used. In the case of recognizing the marking characteristic with AOI, please contact Ricoh sales or our distributor before attempting to use AOI.
11. Please contact Ricoh sales representatives should you have any questions or comments concerning the products or the technical information.

RoHS Compliant
Halogen Free

**Ricoh is committed to reducing the environmental loading materials in electrical devices with a view to contributing to the protection of human health and the environment.**
Ricoh has been providing RoHS compliant products since April 1, 2006 and Halogen-free products since April 1, 2012.

RICOH RICOH ELECTRONIC DEVICES CO., LTD.

https://www.e-devices.ricoh.co.jp/en/

**Sales & Support Offices**


**Ricoh Electronic Devices Co., Ltd.**
**Shin-Yokohama Office (International Sales)**
2-3, Shin-Yokohama 3-chome, Kohoku-ku, Yokohama-shi, Kanagawa, 222-8530, Japan
Phone: +81-50-3814-7687 Fax: +81-45-474-0074

**Ricoh Americas Holdings, Inc.**
675 Campbell Technology Parkway, Suite 200 Campbell, CA 95008, U.S.A.
Phone: +1-408-610-3105

**Ricoh Europe (Netherlands) B.V.**
**Semiconductor Support Centre**
Prof. W.H. Keesomlaan 1, 1183 DJ Amstelveen, The Netherlands
Phone: +31-20-5474-309

**Ricoh International B.V. - German Branch**
**Semiconductor Sales and Support Centre**
Oberrather Strasse 6, 40472 Düsseldorf, Germany
Phone: +49-211-6546-0

**Ricoh Electronic Devices Korea Co., Ltd.**
3F, Haesung Bldg, 504, Teheran-ro, Gangnam-gu, Seoul, 135-725, Korea
Phone: +82-2-2135-5700 Fax: +82-2-2051-5713

**Ricoh Electronic Devices Shanghai Co., Ltd.**
Room 403, No.2 Building, No.690 Bibo Road, Pu Dong New District, Shanghai 201203, People's Republic of China
Phone: +86-21-5027-3200 Fax: +86-21-5027-3299

**Ricoh Electronic Devices Shanghai Co., Ltd.**
**Shenzhen Branch**
1205, Block D(Jinlong Building), Kingkey 100, Hongbao Road, Luohu District, Shenzhen, China
Phone: +86-755-8348-7600 Ext 225

**Ricoh Electronic Devices Co., Ltd.**
**Taipei office**
Room 109, 10F-1, No.51, Hengyang Rd., Taipei City, Taiwan (R.O.C.)
Phone: +886-2-2313-1621/1622 Fax: +886-2-2313-1623


Downloaded from Arrow.com.