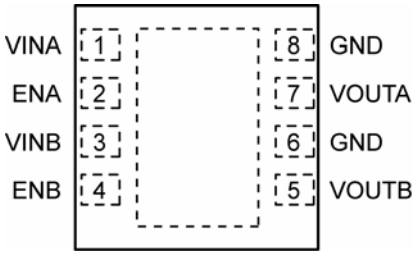
## Ordering Information

| Part Number | Part Marking* | Soft-Start | Load Discharge | Pb-Free Package |
|---|---|---|---|---|
| MIC94066YML | P66 | | | 2x2 mm MLF™ |
| MIC94067YML | P67 | | • | |
| MIC94068YML | P68 | • | | |
| MIC94069YML | P69 | • | • | |

* Note: Over bar symbol may not be to scale

## Pin Configuration




**Top View**
**2x2 mm MLF™ (code)**

## Pin Description

| Pin Number | Pin Name | Pin Function |
|---|---|---|
| 1 | $V_{IN}A$ | Source of P-channel MOSFET. |
| 2 | ENA | Enable (Input): Active-high CMOS compatible control input for switch A. Do not leave floating. |
| 3 | $V_{IN}B$ | Source of P-channel MOSFET. |
| 4 | ENB | Enable (Input): Active-high CMOS compatible control input for switch A. Do not leave floating. |
| 5 | $V_{OUT}B$ | Drain of P-channel MOSFET. |
| 6 | GND | Ground. Both ground pins must be grounded. |
| 7 | $V_{OUT}A$ | Drain of P-channel MOSFET. |
| 8 | GND | Ground. Both ground pins must be grounded. |

## Absolute Maximum Ratings[1]

Input Voltage ($V_{IN}$) ..... +6V
Enable Voltage ($V_{EN}$) ..... +6V
Continuous Drain Current ($I_D$) [3]
$T_A$ = 25°C ..... ±2A
$T_A$ = 85°C ..... ±1.4A
Pulsed Drain Current ($I_{DP}$) [4] ..... ±6A
Continuous Diode Current ($I_S$) [4] ..... –50mA
Storage Temperature ($T_s$) ..... –55°C to +150°C
EDS Rating – HBM [6] ..... 4KV

## Operating Ratings[2]

Input Voltage ($V_{IN}$) ..... +1.7 to +5.5V
Junction Temperature ($T_A$) ..... –40°C to +125°C
Package Thermal Resistance
2x2 MLF ($\Theta_{JA}$) ..... 90°C/W
2x2 MLF ($\Theta_{JC}$) [3] ..... 45°C/W

## Electrical Characteristics

$V_{IN}$ = 5V; $T_A$ = 25°C, bold values indicate –40°C≤ $T_A$ ≤ +85°C, unless noted.

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $V_{EN\_TH}$ | Enable Threshold Voltage | $V_{IN}$ = 1.8V to 4.5V, $I_D$ = –250µA | 0.5 | | 1.2 | V |
| | | $V_{IN}$ = 1.7V to 4.5V, $I_D$ = –250µA | 0.4 | | 1.2 | V |
| $I_{EN}$ | Enable Input Current | $V_{IN}$ = $V_{EN}$ = 5.5V | | 2 | 4 | µA |
| $I_{VIN}$ | OFF State Leakage Current | $V_{IN}$ = +5.5V, $V_{EN}$ = 0V | | | 1 | µA |
| $R_{DS(ON)}$ | P-Channel Drain to Source On Resistance | $V_{IN}$ = +4.5V, ID = –100mA, $V_{EN}$ = 1.5V | | 85 | 115 | mΩ |
| | | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V | | 100 | 140 | mΩ |
| | | $V_{IN}$ = +2.5V, ID = –100mA, $V_{EN}$ = 1.5V | | 145 | 200 | mΩ |
| | | $V_{IN}$ = +1.8V, ID = –100mA, $V_{EN}$ = 1.5V | | 155 | 215 | mΩ |
| | | $V_{IN}$ = +1.7V, ID = –100mA, $V_{EN}$ = 1.5V | | 165 | 225 | mΩ |
| $R_{SHUTDOWN}$ | Turn-off Impedance | $V_{IN}$ = +3.6V, $I_{TEST}$ = 1mA, $V_{EN}$ = 0V MIC94067, 69 | | 200 | 300 | Ω |

## Dynamic

| Symbol | Parameter | Condition | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $t_{ON\_DLY}$ | Turn-On Delay Time | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94066, 67 | | 0.85 | 1.5 | µs |
| | | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94068, 69 | | 700 | 1200 | µs |
| $t_{ON\_RISE}$ | Turn-On Rise Time | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94066, 67 | 0.5 | 1 | 5 | µs |
| | | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94068, 69 | 500 | 800 | 1500 | µs |
| $t_{OFF\_DLY}$ | Turn-Off Delay Time | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94066, 67 | | 115 | 200 | ns |
| | | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94068, 69 | | 100 | 200 | ns |

## Dynamic (cont.)

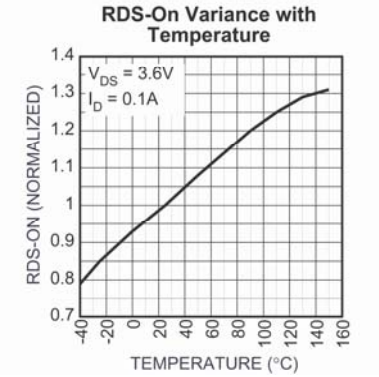
| | | | | | | |
|---|---|---|---|---|---|---|
| $t_{OFF\_FALL}$ | Turn-Off Fall Time | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94066, 67 | | 60 | 100 | ns |
| | | $V_{IN}$ = +3.6V, ID = –100mA, $V_{EN}$ = 1.5V MIC94068, 69 | | 60 | 100 | ns |

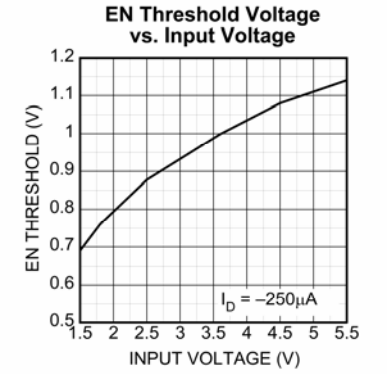
Notes:

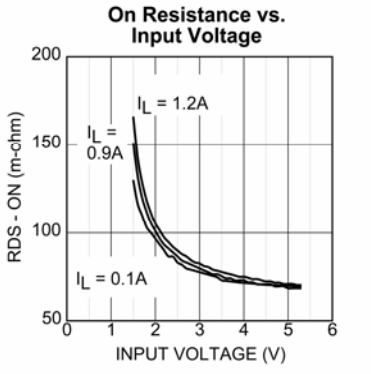
1. Exceeding the absolute maximum rating may damage the device.
2. The device is not guaranteed to function outside its operating rating.
3. With backside thermal contact to PCB.
4. Pulse width <300µs with < 2% duty cycle.
5. Continuous body diode current conduction (reverse conduction, i.e. $V_{OUT}$ to $V_{IN}$) is not recommended.
6. Devices are ESD sensitive. Handling precautions recommended. HBM (Human body model), 1.5k in series with 100pF.

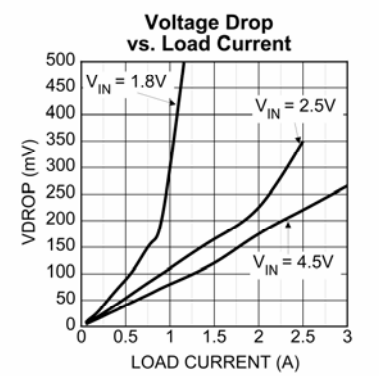
## Typical Characteristics

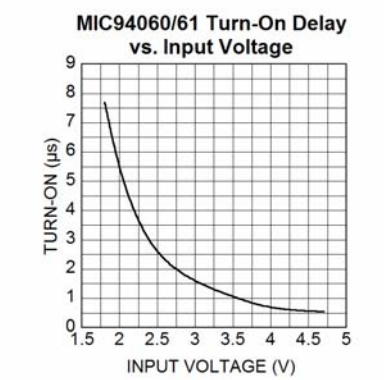
$R_L$ = 100mA, $C_L$ = 0µF for the following plots

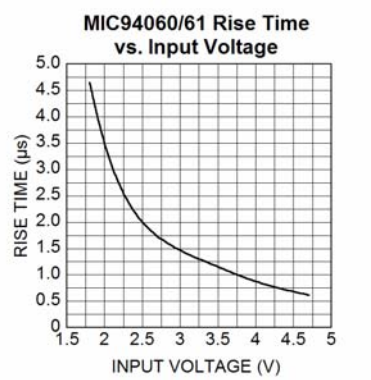


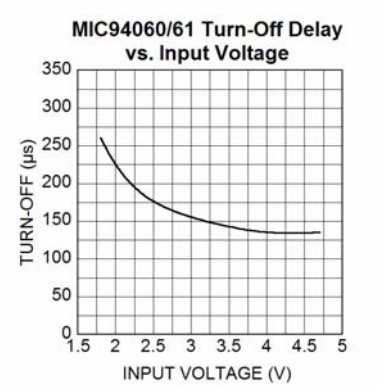



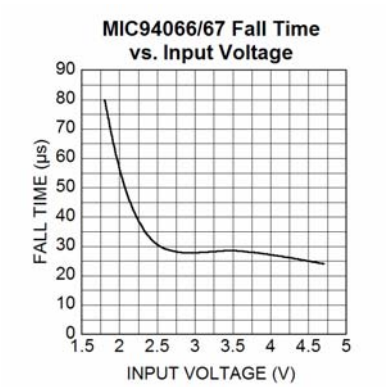



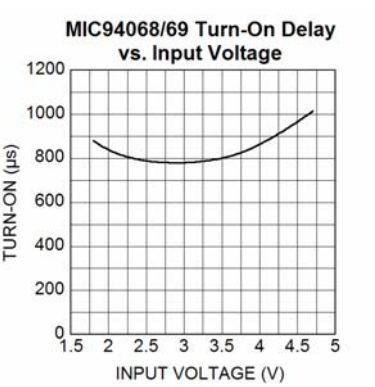



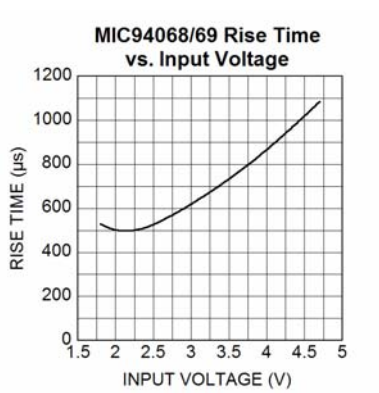



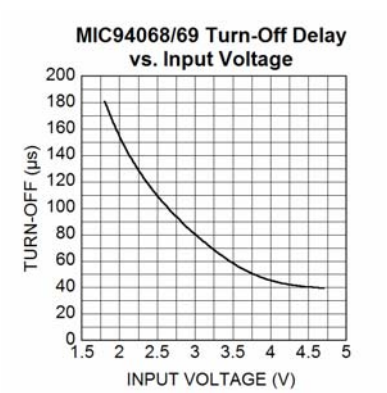



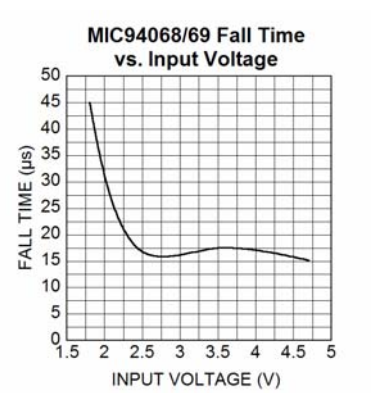



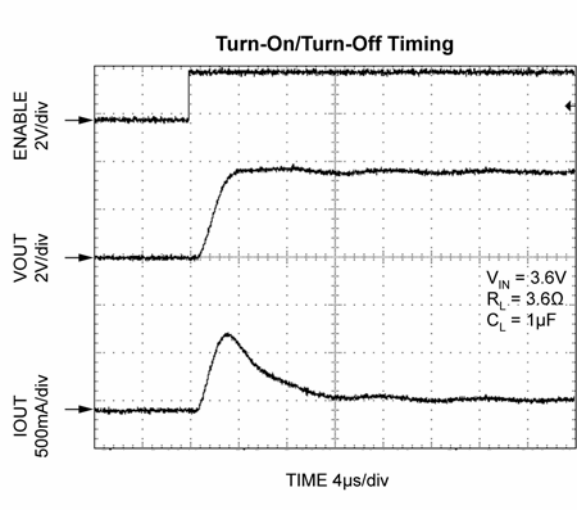



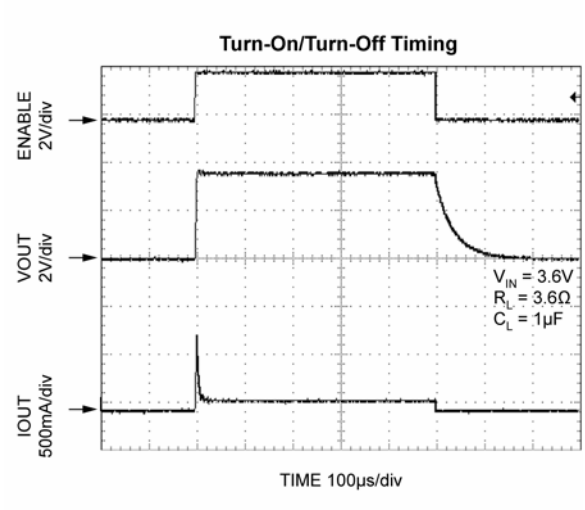



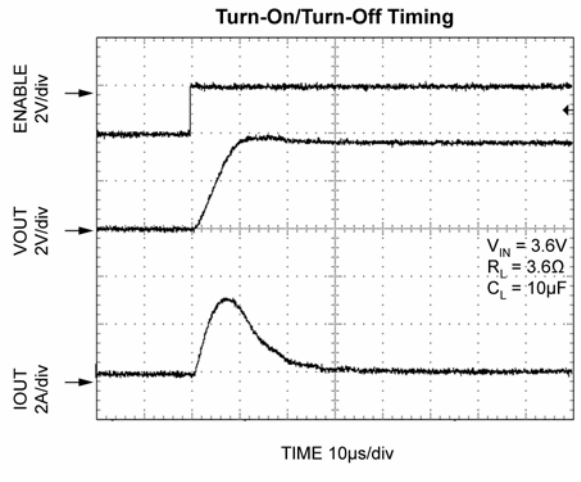



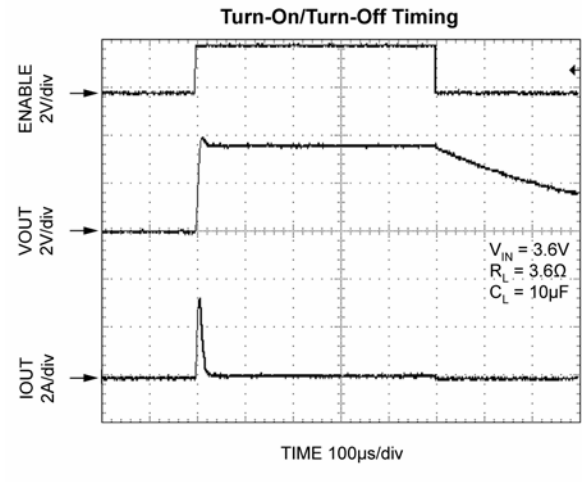
## Functional Characteristics

### MIC94066

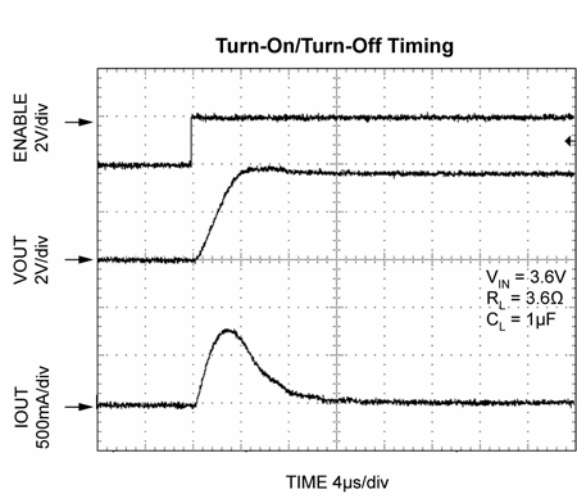


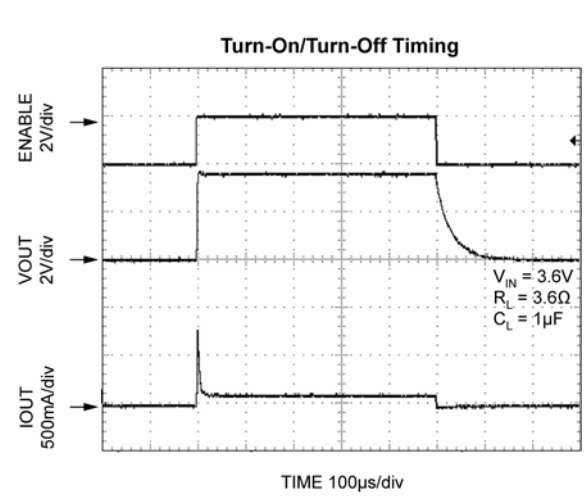



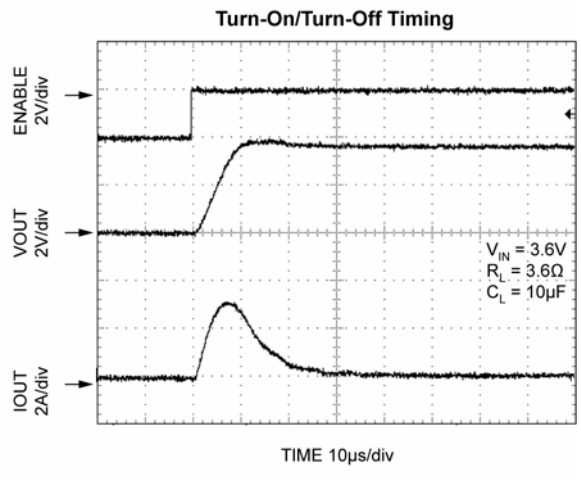



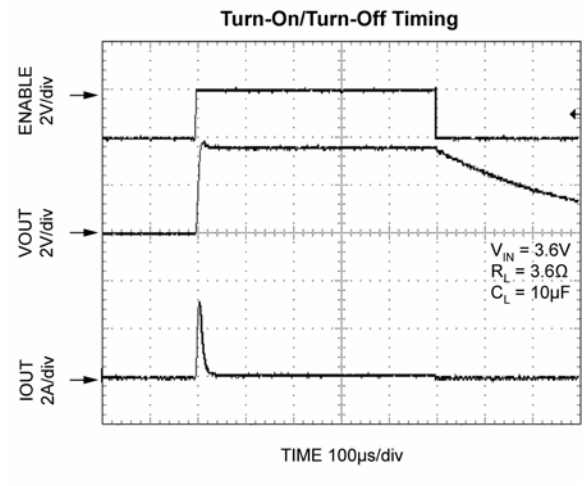



## MIC94067

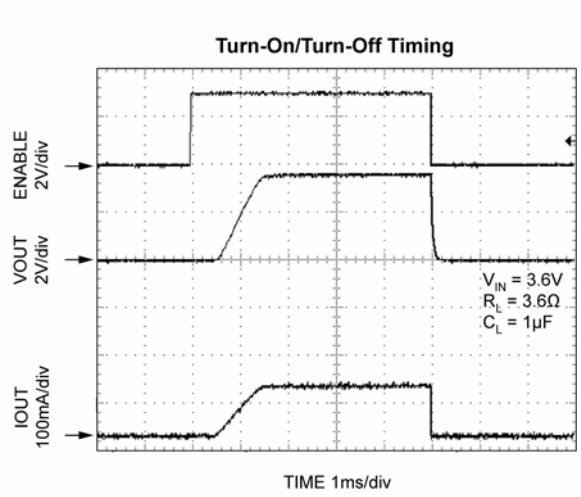


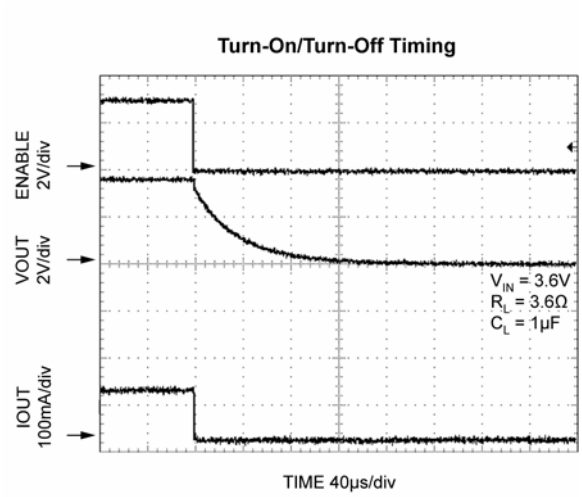



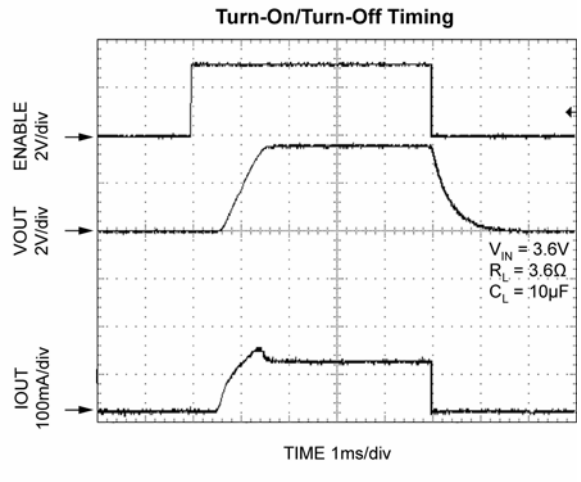



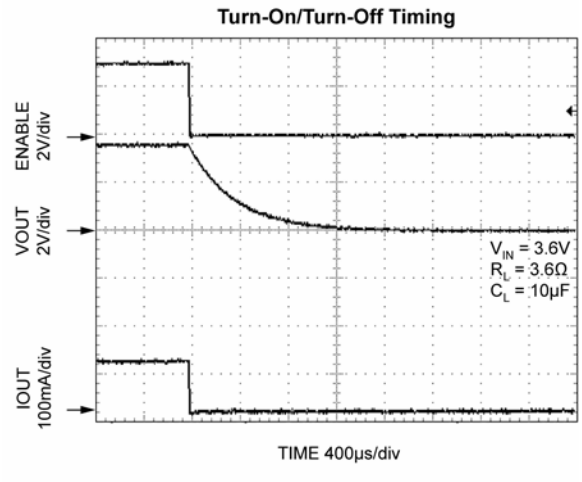



## MIC94068

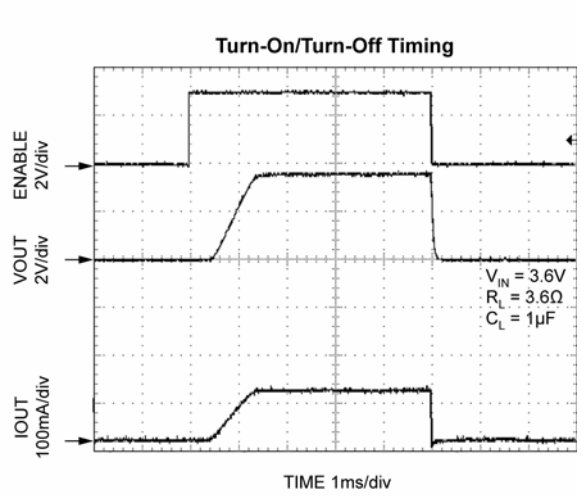


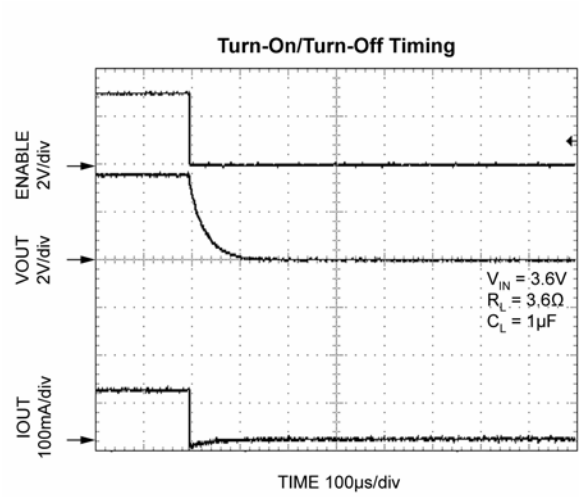



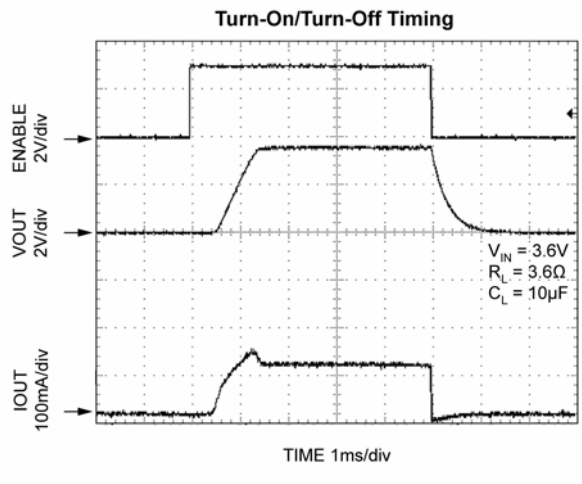



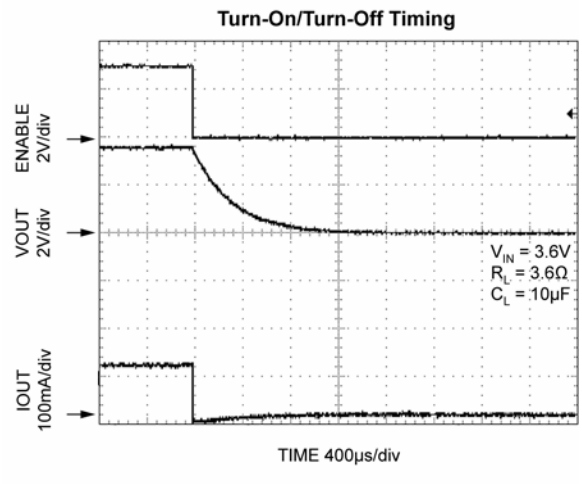



## MIC94069

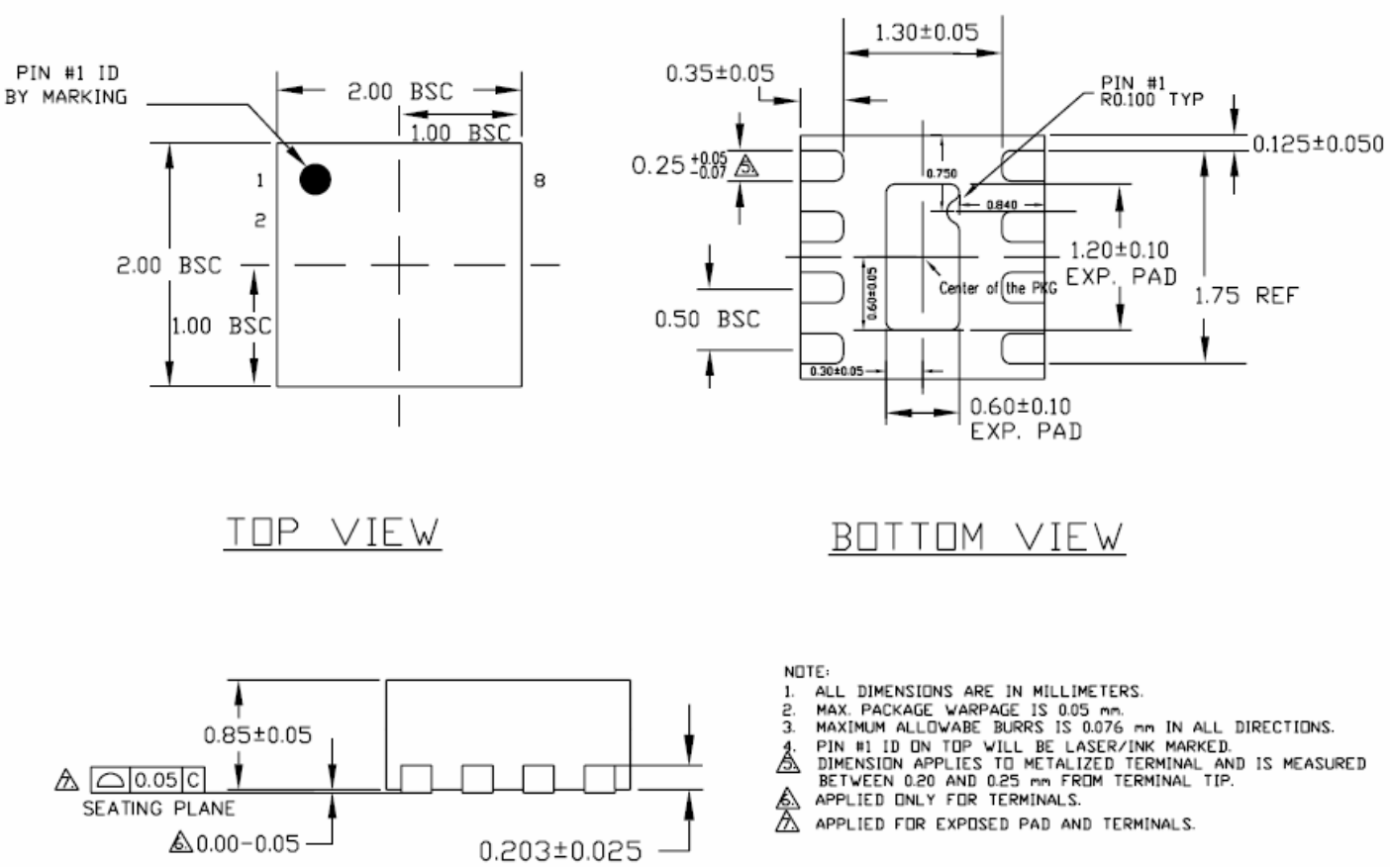


## Package Information




***MICREL, INC. 2180 FORTUNE DRIVE SAN JOSE, CA 95131 USA***
TEL +1 (408) 944-0800 FAX +1 (408) 474-1000 WEB http:/www.micrel.com