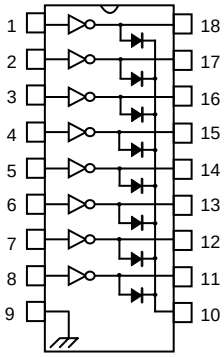
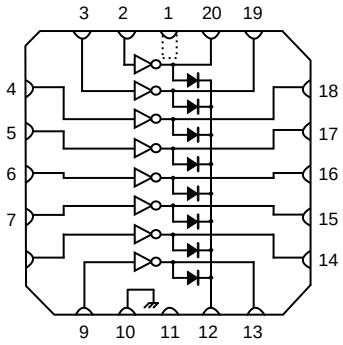
Connection Diagrams and Ordering Information

Ambient Temperature	Type	Package	Part Number	Packaging Type	Connection Diagram
-55°C to 125°C	J	18-Pin Ceramic DIP Package	SG28XXJ-883B SG2801J-JAN SG2802J-JAN SG2803J-JAN SG2804J-JAN SG2803J-DESC SG2821J-DESC SG2823J-DESC SG2824J-DESC SG28XXJ	CERDIP	
0°C to 70°C	DW	18-Pin Plastic SOIC Package	SG2803DW	SOWB	DW Package: RoHS Compliant / Pb-free Transition DC: 0516 Pinout same as J package DW Package: RoHS / Pb-free 100% Matte Tin Lead Finish
-55°C to 125°C	L	20-Pin Ceramic Leadless Chip Carrier	SG28XXL-883B SG2803L-DESC SG2821L-DESC SG2823L-DESC SG2824L-DESC SG28XXL	CLCC	

Note:

1. Contact factory for JAN and DESC product availability.
2. All parts are viewed from the top.
3. See Selection Guide for specific device types.
4. Hermetic Packages J, L use Pb37/Sn63 hot solder lead finish, contact factory for availability of RoHS versions.

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Absolute Maximum Ratings[1]

Parameter	Value	Units
Output Voltage, V_{CE} (SG2800, 2810 series)	50	V
(SG2820 series)	95	V
Input Voltage, V_{IN} (SG2802,3,4 series)	30	V
Continuous Input Current, I_{IN}	25	mA
Continuous Collector Current, IC (SG2800, 2820)	500	mA
(SG2810)	600	mA
Operating Junction Temperature		
Plastic (DW Package)	150	°C
Hermetic (J, L Packages)	150	°C
Storage Temperature Range	-65 to 150	°C
Lead Temperature (Soldering 10 sec.)	300	°C
RoHS Peak Package Solder Reflow Temperature (40 sec. max. exp.)	260 (+0, -5)	°C

Note: 1. Exceeding these ratings could cause damage to the device. All voltages are with respect to ground. Currents are positive into, negative out of specified terminal.

Thermal Data

Parameter	Value	Units
J Package		
Thermal Resistance-Junction to Case, θ_{JC}	25	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	70	°C/W
L Package		
Thermal Resistance-Junction to Case, θ_{JC}	35	°C/W
Thermal Resistance-Junction to Ambient, θ_{JA}	120	°C/W
DW Package		
Thermal Resistance-Junction to Ambient, θ_{JA}	90	°C/W

Note:

1. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.
2. The above numbers for θ_{JC} are maximums for the limiting thermal resistance of the package in a standard mounting configuration. The θ_{JA} numbers are meant to be guidelines for the thermal performance of the device/pcboard system. All of the above assume no ambient airflow.

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Recommended Operating Conditions[1]

Symbol	Parameter	Recommended Operating Conditions			Units
		Min.	Typ.	Max.	
V_{CE}	Output Voltage				
	SG2800, SG2820 series			50	V
	SG2810 series			95	V
I_C	Peak Collector Current, I_C				
	SG2800, SG2820 series			350	mA
	SG2810 series			500	mA
Operating Ambient Temperature Range:					
	J, L Packages	-55		125	°C
	DW Packages	0		70	°C

Note: 1. Range over which the device is functional.

Selection Guide

Device	V_{CE} Max	I_C Max	Logic Inputs
SG2801	50V	500mA	General Purpose PMOS, CMOS
SG2802			14V-25V PMOS
SG2803			5V TTL, CMOS
SG2804			6V-15V CMOS, PMOS
SG2811		600mA	General Purpose PMOS, CMOS
SG2812			14V-25V PMOS
SG2813			5V TTL, CMOS
SG2814			6V-15V CMOS, PMOS
SG2815			High Output TTL
SG2821	95V	500mA	General Purpose PMOS, CMOS
SG2823			5V TTL, CMOS
SG2824			6V-15V CMOS, PMOS

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Electrical Characteristics

(Unless otherwise specified, these specifications apply over the operating ambient temperatures of -55°C ≤ T_A ≤ 125°C, for the J & L devices and 0°C ≤ T_A ≤ 70°C, for the DW device. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

Table 1 · SG2801 thru SG2804

Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
I_{CEX}	Output Leakage Current (Figure 2a)	All		V_{CE} = 50V			100	µA
	Output Leakage Current (Figure 2b)	SG2802		V_{CE} = 50V, V_{IN} = 6V			500	µA
		SG2804		V_{CE} = 50V, V_{IN} = 1V			500	µA
$V_{CE(SAT)}$	Collector – Emitter ($V_{CE(SAT)}$) (Figure 3)	All	$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
			$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
			$T_A = T_{MIN}$	I_C = 100mA, I_B = 350µA		1.1	1.3	V
			T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
			T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
			T_A = 25°C	I_C = 100mA, I_B = 250µA		0.9	1.1	V
			$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
			$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
			$T_A = T_{MAX}$	I_C = 100mA, I_B = 250µA		1.1	1.3	V
$I_{IN(ON)}$	Input Current (Figure 4)	SG2802		V_{IN} = 17V	480	850	1300	µA
		SG2803		V_{IN} = 3.85V	650	930	1350	µA
		SG2804		V_{IN} = 5V	240	350	500	µA
				V_{IN} = 12V	650	1000	1450	µA
$I_{IN(OFF)}$	Input Current (Figure 5)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
$V_{IN(ON)}$	Input Voltage (Figure 6)	SG2802	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			18	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			13	V
		SG2803	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			3.3	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			2.4	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
		SG2804	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 125mA			6.0	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			8.0	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 125mA			5.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			6.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V

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Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
h_{FE}	D-C Forward Current Transfer Ratio (Figure 3)	SG2801	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			
			T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
C_{IN}	Input Capacitance[1]	All	T_A = 25°C			15	25	pF
TPLH	Turn-On Delay		T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
TPHL	Turn-Off Delay		T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
I_R	Clamp Diode Leakage Current (Figure 7)			V_R = 50V			50	µA
V_F	Clamp Diode Forward Voltage (Figure 8)			I_F = 350mA		1.7	2.0	V
Note: [1]This parameter, although guaranteed, are not tested in production.								

Table 2 · SG2811 thru SG2815

Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
I_{CEX}	Output Leakage Current (Figure 2a)	All		V_{CE} = 50V			100	µA
	Output Leakage Current (Figure 2b)	SG2812		V_{CE} = 50V, V_{IN} = 6V			500	µA
		SG2814		V_{CE} = 50V, V_{IN} = 1V			500	µA
$V_{CE(SAT)}$	Collector – Emitter ($V_{CE(SAT)}$) (Figure 3)	All	$T_A = T_{MIN}$	I_C = 500mA, I_B = 1100µA		1.8	1.1	V
			$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
			$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
			T_A = 25°C	I_C = 500mA, I_B = 600µA		1.7	1.9	V
			T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
			T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
			$T_A = T_{MAX}$	I_C = 500mA, I_B = 600µA		1.8	2.1	V
			$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
			$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
$I_{IN(ON)}$	Input Current (Figure 4)	SG2812		V_{IN} = 17V	480	850	1300	µA
		SG2813		V_{IN} = 3.85V	650	930	1350	µA
		SG2814		V_{IN} = 5V	240	350	500	µA
				V_{IN} = 12V	650	1000	1450	µA
		SG2815		V_{IN} = 3V	1180	1500	2400	µA
$I_{IN(OFF)}$	Input Current (Figure 5)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
$V_{IN(ON)}$	Input Voltage (Figure 6)	SG2812	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			23.5	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			17	V

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Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
$V_{IN(ON)}$	Input Voltage (Figure 6)	SG2813	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			6.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			3.5	V
		SG2814	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			17	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			9.5	V
		SG2815	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			3.0	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			3.5	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			2.4	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			2.6	V
h_{FE}	D-C Forward Current Transfer Ratio (Figure 3)	SG2811	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA	450			
			T_A = 25°C	V_{CE} = 2V, I_C = 500mA	900			
C_{IN}	Input Capacitance[1]	All	T_A = 25°C			15	25	pF
TPLH	Turn-On Delay		T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
TPHL	Turn-Off Delay		T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
I_R	Clamp Diode Leakage Current (Figure 7)			V_R = 50V			50	µA
V_F	Clamp Diode Forward Voltage (Figure 8)			I_F = 350mA		1.7	2.0	V
				I_F = 500mA			2.5	V
Note: [1]This parameter, although guaranteed, are not tested in production.								

Table 3 · SG2821 thru SG2824

Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
I_{CEX}	Output Leakage Current (Figure 2a)	All		V_{CE} = 95V			100	µA
	Output Leakage Current (Figure 2b)	SG2824		V_{CE} = 95V, V_{IN} = 1V			500	µA

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Symbol	Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
					Min	Type	Max	
$V_{CE(SAT)}$	Collector – Emitter ($V_{CE(SAT)}$) (Figure 3)	All	$T_A = T_{MIN}$	I_C = 350mA, I_B = 850µA		1.6	1.8	V
			$T_A = T_{MIN}$	I_C = 200mA, I_B = 550µA		1.3	1.5	V
			$T_A = T_{MIN}$	I_C = 100mA, I_B = 350µA		1.1	1.3	V
			T_A = 25°C	I_C = 350mA, I_B = 500µA		1.25	1.6	V
			T_A = 25°C	I_C = 200mA, I_B = 350µA		1.1	1.3	V
			T_A = 25°C	I_C = 100mA, I_B = 250µA		0.9	1.1	V
			$T_A = T_{MAX}$	I_C = 350mA, I_B = 500µA		1.6	1.8	V
			$T_A = T_{MAX}$	I_C = 200mA, I_B = 350µA		1.3	1.5	V
			$T_A = T_{MAX}$	I_C = 100mA, I_B = 250µA		1.1	1.3	V
$I_{IN(ON)}$	Input Current (Figure 4)	SG2823		V_{IN} = 3.85V	650	930	1350	µA
		SG2824		V_{IN} = 5V	240	350	500	µA
				V_{IN} = 12V	650	1000	1450	µA
$I_{IN(OFF)}$	Input Current (Figure 5)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
$V_{IN(ON)}$	Input Voltage (Figure 6)	SG2823	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			3.3	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 250mA			3.6	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			3.9	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			2.4	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 250mA			2.7	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			3.0	V
		SG2824	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 125mA			6.0	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 200mA			8.0	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 275mA			10	V
			$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA			12	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 125mA			5.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 200mA			6.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 275mA			7.0	V
			$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 350mA			8.0	V
h_{FE}	D-C Forward Current Transfer Ratio (Figure 3)	SG2821	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			
			T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
C_{IN}	Input Capacitance[1]	All	T_A = 25°C			15	25	pF
TPLH	Turn-On Delay			0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
TPHL	Turn-Off Delay			0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
I_R	Clamp Diode Leakage Current (Figure 7)			V_R = 95V			50	µA
V_F	Clamp Diode Forward Voltage (Figure 8)			I_F = 350mA		1.7	2.0	V

Note: [1]This parameter, although guaranteed, are not tested in production.

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Parameter Test Figures

(See figure numbers in Electrical Characteristics Tables 1 to 3)

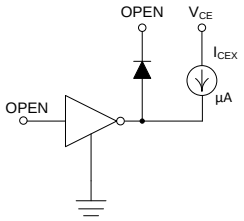

Figure 2a
I_{CEX} Test Circuit

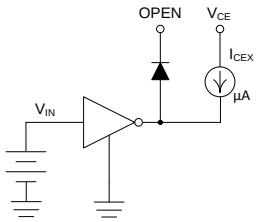

Figure 2b
I_{CEX} Test Circuit

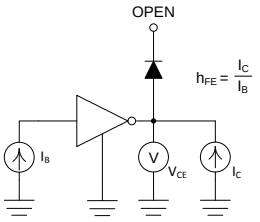

Figure 3
h_{FE}, $V_{CE(sat)}$ Test Circuit

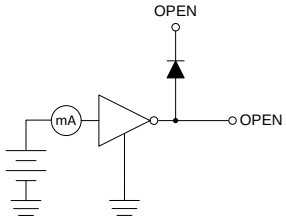

Figure 4
$I_{IN\ (ON)}$ Test Circuit

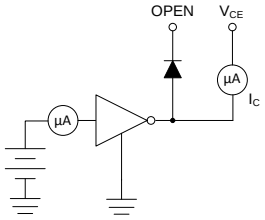

Figure 5
$I_{IN\ (OFF)}$ Test Circuit

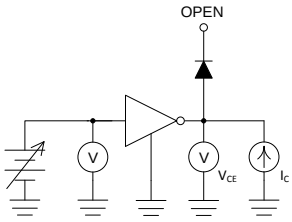

Figure 6
$V_{IN(ON)}$ Test Circuit

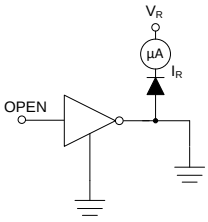

Figure 7
I_R Test Circuit

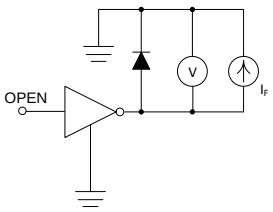

Figure 8
V_F Test Circuit

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Characteristic Curves

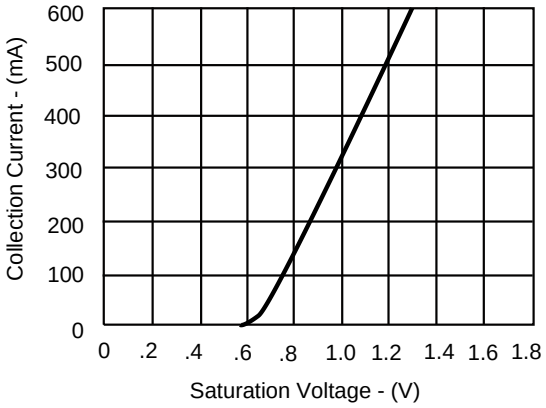

Figure 8 · Output Characteristics

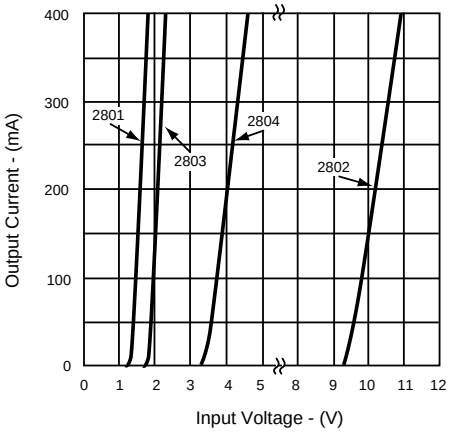

Figure 9 · Output Current Vs. Input Voltage

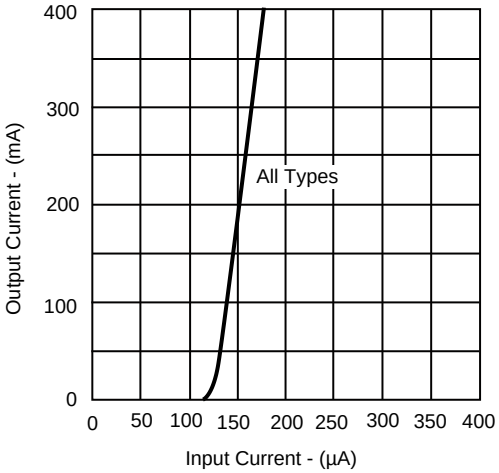

Figure 10 · Output Current Vs. Input Current

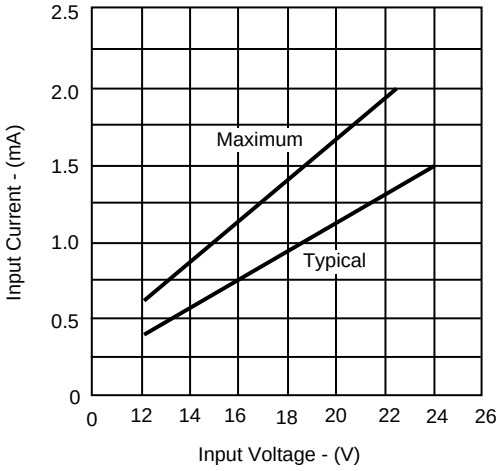

Figure 11 · Input Characteristics - SG2802

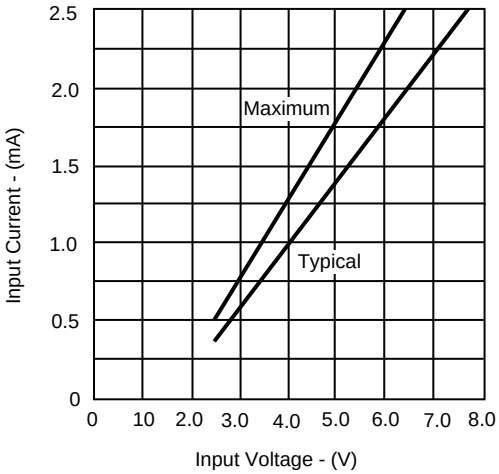

Figure 12 · Input Characteristics - SG2803

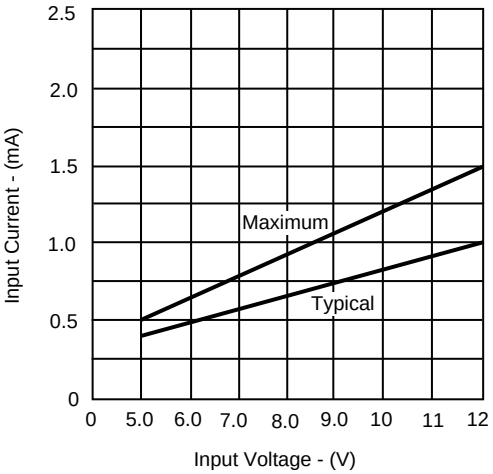

Figure 13 · Input Characteristics - SG2804

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Characteristic Curves - Continued

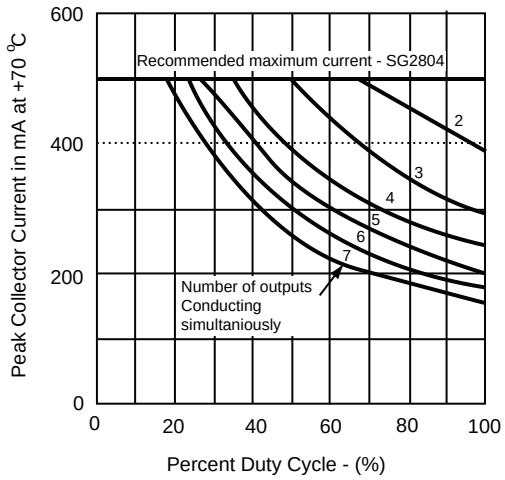

Figure 14 · Peak Collector Current Vs. Duty Cycle

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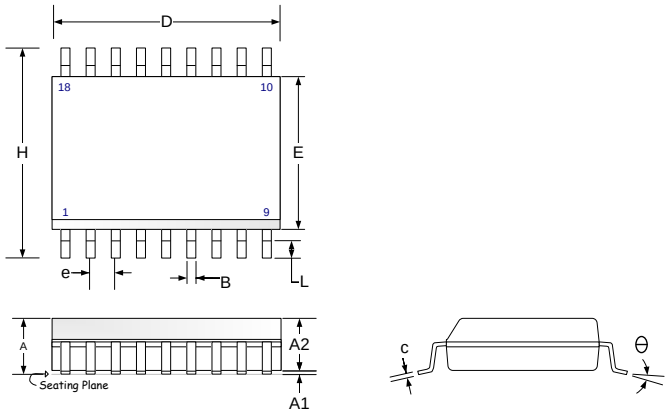
Package Outline Dimensions

Controlling dimensions are in inches, metric equivalents are shown for general information.



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	2.06	2.65	0.081	0.104
A1	0.10	0.30	0.004	0.012
A2	2.03	2.55	0.080	0.100
B	0.25	0.51	0.010	0.020
c	0.23	0.32	0.009	0.013
D	-	13.21	-	0.520
E	7.40	7.75	0.291	0.305
e	1.27 BSC		0.50 BSC	
H	10.00	10.65	0.394	0.419
L	0.4	1.27	0.016	0.050
Θ	0	8	0	8
*LC	-	0.10	-	0.004

*Lead coplanarity

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006”) on any side. Lead dimension shall not include solder coverage.

Figure 15 · DW Package Dimensions

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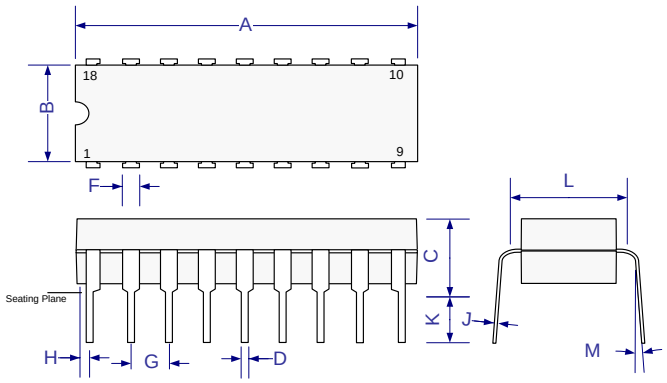
Package Outline Dimensions

Controlling dimensions are in inches, metric equivalents are shown for general information.

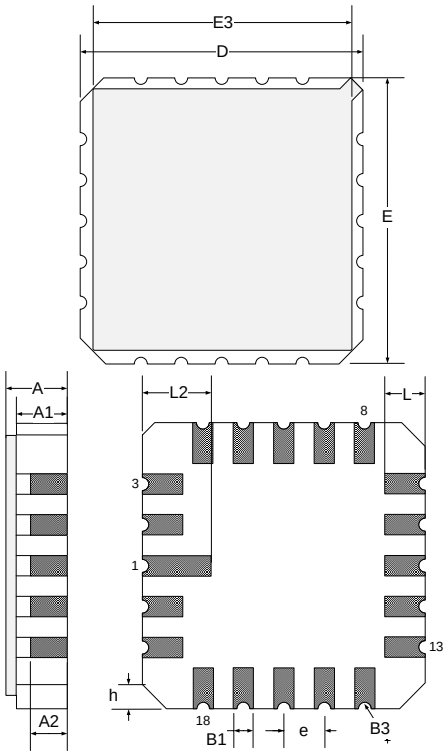


Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	24.38	-	0.960
B	5.59	7.11	0.220	0.280
C	-	5.08	-	0.200
D	0.38	0.51	0.015	0.020
F	1.02	1.77	0.040	0.070
G	2.54 BSC		0.100 BSC	
H	-	2.03	-	0.080
J	0.20	0.38	0.008	0.015
K	3.18	5.08	0.125	0.200
L	7.37	7.87	0.290	0.310
M	-	15°	-	15°

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006") on any side. Lead dimension shall not include solder coverage.

Figure 16 · J 18-Pin Ceramic Dual Inline Package Dimensions



Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
D/E	8.64	9.14	0.340	0.360
E3	-	8.128	-	0.320
e	1.270 BSC		0.050 BSC	
B1	0.635 TYP		0.025 TYP	
L	1.02	1.52	0.040	0.060
A	1.626	2.286	0.064	0.090
h	1.016 TYP		0.040 TYP	
A1	1.372	1.68	0.054	0.066
A2	-	1.168	-	0.046
L2	1.91	2.41	0.075	0.95
B3	0.203R		0.008R	

Note:

1. All exposed metalized area shall be gold plated 60 micro-inch minimum thickness over nickel plated unless otherwise specified in purchase order.

Figure 17 · L 20-Pin Ceramic Leadless Chip Carrier (LCC) Package Outline Dimensions

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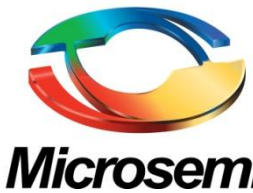

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