Absolute Maximum Ratings (Note 1)

Output Voltage, V_{CE}
- (SG2000, 2010 series) 50V
- (SG2020 series) 95V

Input Voltage, V_{IN}
- (SG2002,3,4) 30V

Continuous Input Current, I_{IN} 25mA

Note 1. Values beyond which damage may occur.

Peak Collector Current, I_C
- (SG2000, 2020) 500mA
- (SG2010) 600mA

Operating Junction Temperature
- Hermetic (J, L Packages) ..... 150°C
- Plastic (DW Package) ..... 25°C

Storage Temperature Range ..... -65°C to 150°C

Lead Temperature (Soldering 10 sec.) ..... 300°C

RoHS Peak Package Solder Reflow Temp. (40 sec. max. exp.)..... 260°C (+0, -5)

Thermal Data

J Package:
- Thermal Resistance-Junction to Case, θ_{JC} ..... 30°C/W
- Thermal Resistance-Junction to Ambient, θ_{JA} ..... 80°C/W

DW Package:
- Thermal Resistance-Junction to Case, θ_{JC} ..... 35°C/W
- Thermal Resistance-Junction to Ambient, θ_{JA} ..... 90°C/W

L Package:
- Thermal Resistance-Junction to Case, θ_{JC} ..... 35°C/W
- Thermal Resistance-Junction to Ambient, θ_{JA} ..... 120°C/W

Note A. Junction Temperature Calculation: $T_J = T_A + (P_D \times \theta_{JA})$.

Note B. 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/pc-board system. All of the above assume no ambient airflow.

Recommended Operating Conditions (Note 2)

Output Voltage, V_{CE}
- SG2000, SG2010 series 50V
- SG2020 series 95V

Note 2. Range over which the device is functional.

Peak Collector Current, I_C
- SG2000, SG2020 series 50mA
- SG2010 series 500mA

Operating Ambient Temperature Range
- SG2000 Series - Hermetic ..... -55°C to 125°C
- SG2000 Series - Plastic ..... 0°C to 70°C

Selection Guide

Device	V_{CE} Max	I_C Max	Logic Inputs
SG2001	50V	500mA	General Purpose PMOS, CMOS
SG2002	50V	500mA	14V-25V PMOS
SG2003	50V	500mA	5V TTL, CMOS
SG2004	50V	500mA	6V-15V CMOS, PMOS
SG2011	50V	600mA	General Purpose PMOS, CMOS
SG2012	50V	600mA	14V-25V PMOS

Device	V_{CE} Max	I_C Max	Logic Inputs
SG2013	50V	600mA	5V TTL, CMOS
SG2014	50V	600mA	6V-15V CMOS, PMOS
SG2015	50V	600mA	High Output TTL
SG2021	95V	500mA	General Purpose PMOS, CMOS
SG2023	95V	500mA	5V TTL, CMOS
SG2024	95V	500mA	6V-15V CMOS, PMOS

Electrical Characteristics

(Unless otherwise specified, these specifications apply over the operating ambient temperatures for SG2000 series - Hermetic - with $-55°C \le T_A \le 125°C$ and SG2000 series - Plastic - with $0°C \le T_A \le 70°C$. Low duty cycle pulse testing techniques are used which maintains junction and case temperatures equal to the ambient temperature.)

SG2001 thru SG2004

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min	Typ	Max	
Output Leakage Current (I_{CEX})	All		V_{CE} = 50V			100	µA
	SG2002		V_{CE} = 50V, V_{IN} = 6V			500	µA
	SG2004		V_{CE} = 50V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	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
Input Current ($I_{IN(ON)}$)	SG2002		V_{IN} = 17V	480	850	1300	µA
	SG2003		V_{IN} = 3.85V	650	930	1350	µA
	SG2004		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
Input Current ($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)	SG2002	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 300mA			18	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			13	V
	SG2003	$T_A = T_{MIN}$	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
	SG2004	$T_A = T_{MIN}$	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
DC Forward Current	SG2001	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			mA
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 50V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V

Note 3. These parameters, although guaranteed, are not tested in production.

Electrical Characteristics (continued)

SG2011 thru SG2015

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min	Typ	Max	
Output Leakage Current (I_{CEX})	All		V_{CE} = 50V			100	µA
	SG2012		V_{CE} = 50V, V_{IN} = 6V			500	µA
	SG2014		V_{CE} = 50V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	All	$T_A = T_{MIN}$	I_C = 500mA, I_B = 1100µA		1.8	2.1	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
Input Current ($I_{IN(ON)}$)	SG2012		V_{IN} = 17V	480	850	1300	µA
	SG2013		V_{IN} = 3.85V	650	930	1350	µA
	SG2014		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
	SG2015		V_{IN} = 3V	1180	1500	2400	µA
Input Current ($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)	SG2012	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA			23.5	V
		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 500mA			17	V
	SG2013	$T_A = T_{MIN}$	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
	SG2014	$T_A = T_{MIN}$	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
	SG2015	$T_A = T_{MIN}$	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
DC Forward Current	SG2011	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 500mA	450			mA
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 500mA	900			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 50V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V
			I_F = 500mA			2.5	V

Note 3. These parameters, although guaranteed, are not tested in production.

Electrical Characteristics (continued)

SG2021 thru SG2024

Parameter	Applicable Devices	Temp.	Test Conditions	Limits			Units
				Min	Typ	Max	
Output Leakage Current (I_{CEX})	All		V_{CE} = 95V			100	µA
	SG2024		V_{CE} = 95V, V_{IN} = 1V			500	µA
Collector - Emitter ($V_{CE(SAT)}$)	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
Input Current ($I_{IN(ON)}$)	SG2023		V_{IN} = 3.85V	650	930	1350	µA
	SG2024		V_{IN} = 5V	240	350	500	µA
			V_{IN} = 12V	650	1000	1450	µA
Input Current ($I_{IN(OFF)}$)	All	$T_A = T_{MAX}$	I_C = 500µA	25	50		µA
Input Voltage ($V_{IN(ON)}$)		$T_A = T_{MAX}$	V_{CE} = 2V, I_C = 300mA			13	V
	SG2023	$T_A = T_{MIN}$	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
	SG2024	$T_A = T_{MIN}$	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
DC Forward Current	SG2021	$T_A = T_{MIN}$	V_{CE} = 2V, I_C = 350mA	500			mA
Transfer Ratio (h_{FE})		T_A = 25°C	V_{CE} = 2V, I_C = 350mA	1000			
Input Capacitance (C_{IN}) (Note 3)	All	T_A = 25°C			15	25	pF
Turn-On Delay (TPLH)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Turn-Off Delay (TPHL)	All	T_A = 25°C	0.5 E_{IN} to 0.5 E_{OUT}		250	1000	ns
Clamp Diode Leakage Current (I_R)	All		V_R = 95V			50	µA
Clamp Diode Forward Voltage (V_F)	All		I_F = 350mA		1.7	2.0	V

Note 3. These parameters, although guaranteed, are not tested in production.

Characteristic Curves

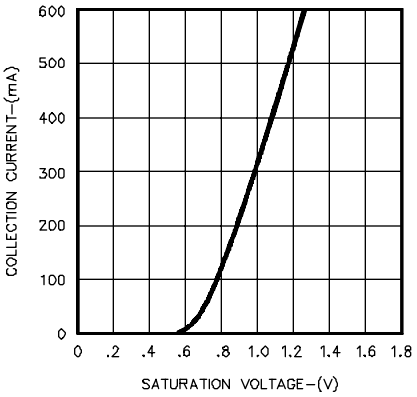


FIGURE 2. OUTPUT CHARACTERISTICS

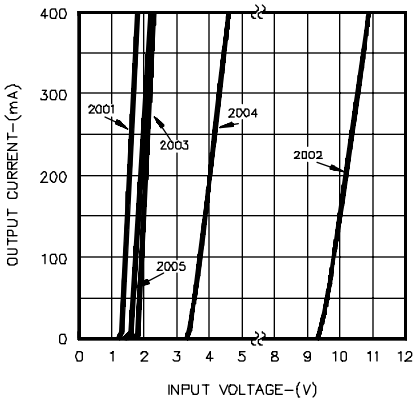


FIGURE 3. OUTPUT CURRENT VS. INPUT VOLTAGE

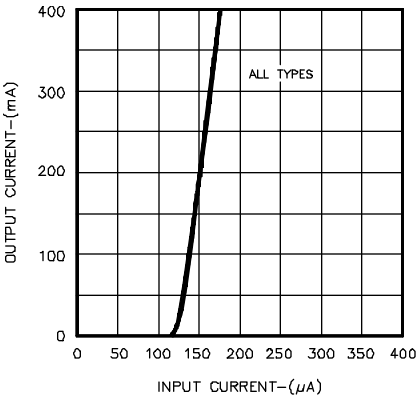


FIGURE 4. OUTPUT CURRENT VS. INPUT CURRENT

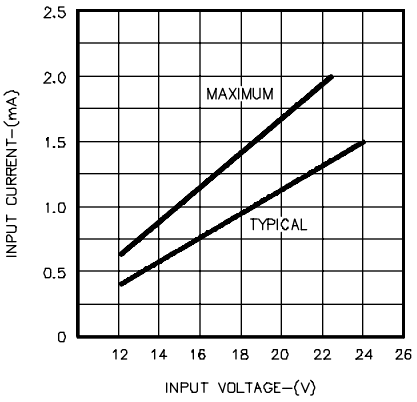


FIGURE 5. INPUT CHARACTERISTICS - SG2002

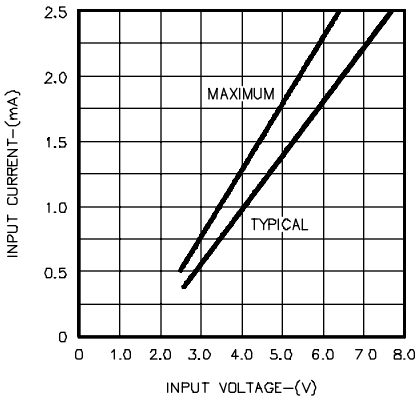


FIGURE 6. INPUT CHARACTERISTICS - SG2003

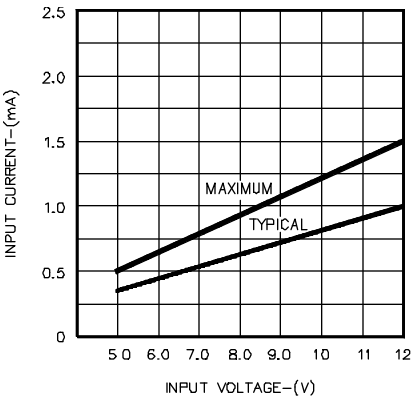


FIGURE 7. INPUT CHARACTERISTICS - SG2004

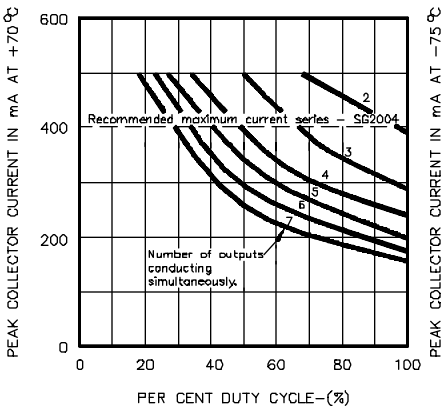
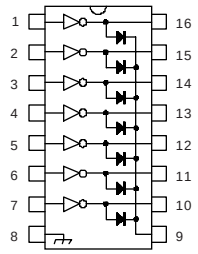
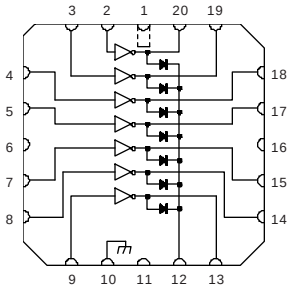


FIGURE 8. PEAK COLLECTOR CURRENT VS. DUTY CYCLE

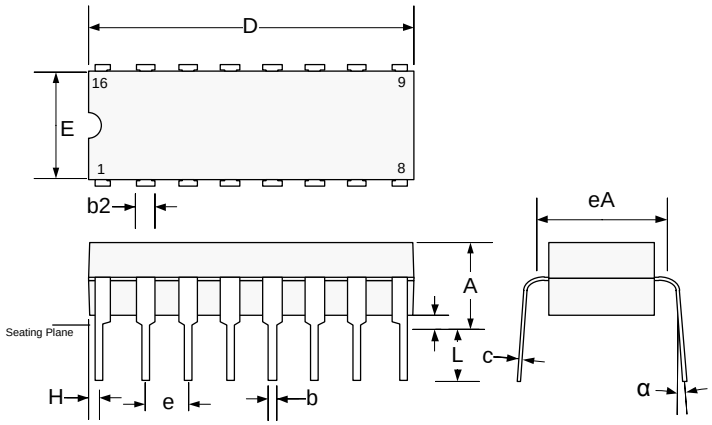
Connection Diagrams and Ordering Information (See Notes Below)

Package	Part No. (Note 3)	Ambient Temperature Range	Connection Diagram
16-PIN CERAMIC DIP J - PACKAGE	SG2XXXJ-883B SG2023J-DESC SG2001J-JAN SG2002J-JAN SG2003J-JAN SG2004J-JAN SG2XXXJ	-55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C -55°C to 125°C	
16-PIN PLASTIC SOIC DW - PACKAGE	SG2003DW SG2023DW	0°C to 70°C 0°C to 70°C	DW Package: RoHS Compliant / Pb-free Transition DC: 0516 DW Package: RoHS / Pb-free 100% Matte Tin Lead Finish
20-PIN CERAMIC LEADLESS CHIP CARRIER L- PACKAGE	SG2XXXL-883B SG2XXXL	-55°C to 125°C -55°C to 125°C	

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. DW Package (Not Pictured) is 16-Pin Wide Body SOIC, same pinout as J package pictured above.
5. Hermetic Packages J and L use Pb37/Sn63 hot solder lead finish, contact factory for availability of RoHS versions.

Package Outline Dimensions

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



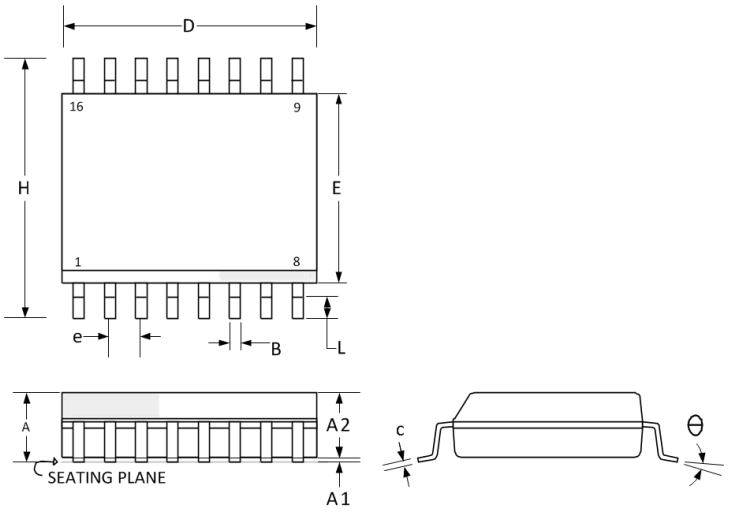
Dim	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A		5.08		0.200
b	0.38	0.51	0.015	0.020
b2	1.04	1.65	0.045	0.065
c	0.20	0.38	0.008	0.015
D	19.30	19.94	0.760	0.785
E	5.59	7.11	0.220	0.280
e	2.54 BSC*		0.100 BSC	
eA	7.37	7.87	0.290	0.310
H	0.63	1.78	0.025	0.070
L	3.18	5.08	0.125	0.200
α	-	15°	-	15°
Q	0.51	1.02	0.020	0.040

**BSC: Basic Spacing Between Centers*

Note:

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

Figure 9 · J 16-Pin CERDIP Package Dimensions



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	0.33	0.51	0.013	0.020
c	0.23	0.32	0.009	0.013
D	10.08	10.50	0.397	0.413
E	7.40	7.60	0.291	0.299
e	1.27 BSC		0.05 BSC	
H	10.00	10.65	0.394	0.419
L	0.40	1.27	0.016	0.050
θ	0°	8°	0°	8°
*LC	-	0.10	-	0.004

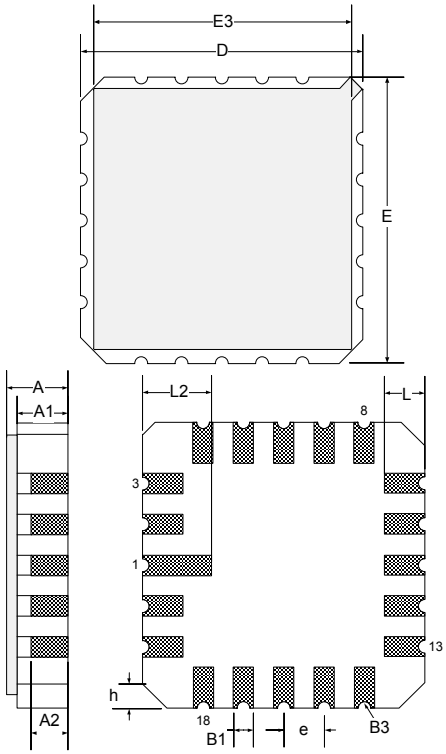
*Lead co planarity

Note:

Dimensions do not include protrusions; these shall not exceed 0.155mm (.006”) on any side. Lead dimension shall not include solder coverage. Dimensions are in mm, inches are for reference only.

Figure 10 · DW 16-Pin SOWB Package Dimensions

Package Outline Dimensions (continued)



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:

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

Figure 11 · L 20-Pin Ceramic LCC Package Outline Dimensions

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