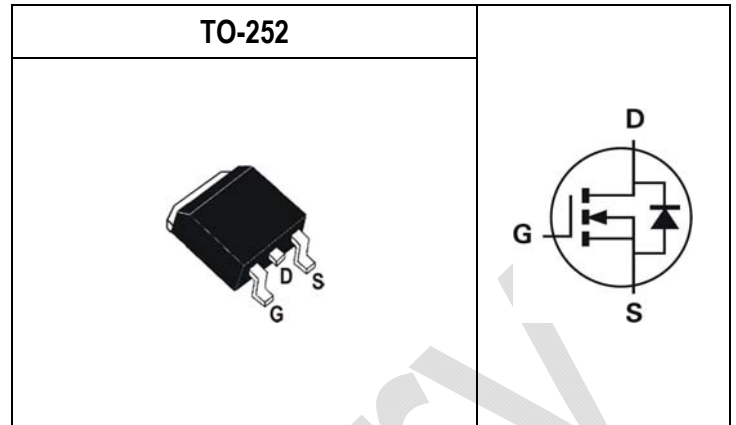


Key Performance Parameters		
Parameter	Value	Unit
$V_{DS}$	100	V
$R_{DS(ON) \max.} V_{GS}=10V$	8	m $\Omega$
$I_D$	58	A
$Q_g$	55.7	nC
$Q_{gd}$	13.9	nC
$Q_{SW}$	19.0	nC



Features	Application
<ul style="list-style-type: none"> <li>Optimized for synchronous rectification Low Input Capacitance</li> <li>Low Miller Capacitance</li> <li>Fully Characterized Capacitance and Avalanche</li> <li>Pb-free lead plating; RoHS compliant</li> </ul>	<ul style="list-style-type: none"> <li>BLDC Motor drive applications</li> <li>Battery powered circuits</li> <li>Synchronous rectifier applications</li> <li>Resonant mode power supplies</li> </ul>

## Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG100N16D	Halogen-Free	TO-252	D	Tape & Reel	2,500

## Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	$T_C=25^\circ\text{C}$	58
		$T_C=100^\circ\text{C}$	36
Drain Current-Pulsed <sup>Note 1</sup>	$I_{DM}$	63	A
Avalanche Current	$I_{AR}$	5.5	A
Single Pulse Avalanche Energy <sup>Note 3</sup>	$E_{AS}$	1.5	mJ
Maximum Power Dissipation	$P_{tot}$	52	W
Operating Junction Temperature Range	$T_J$	150	$^\circ\text{C}$

## Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Junction-to-Ambient <sup>Note 2</sup>	$R_{\theta JA}$	Steady State	-	52.9		$^\circ\text{C/W}$
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	2.39		$^\circ\text{C/W}$

### Notes:

- Pulse Test: Pulse Width  $\leq 10\text{ms}$ , Duty Cycle  $\leq 1\%$ .
- $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JC}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 in still air.
- Starting  $T_J=25^\circ\text{C}$ ,  $L=0.1\text{mH}$ ,  $R_g=50\Omega$ ,  $V_D=50\text{V}$ ,  $V_{GS}=10\text{V}$ .

## Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =1mA	100	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	-	-	10	μA
		V <sub>DS</sub> =100V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C	-	-	100	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1.2	-	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =20A	-	-	8	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>DS</sub> =15A	-	-	11	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.65	-	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>DS</sub> =20A	-	36	-	S

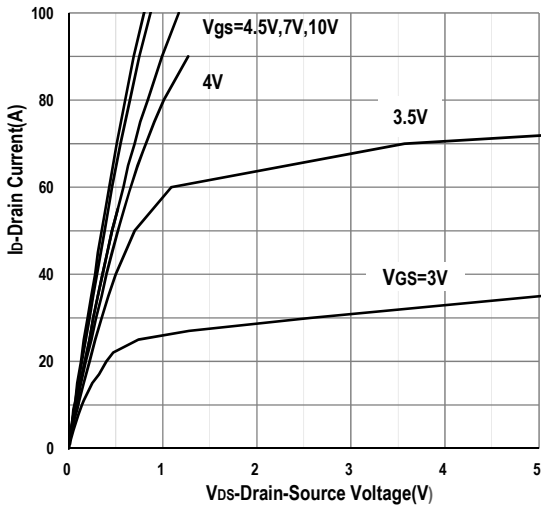
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	2554	-	pF
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	364	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	29	-	pF
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =45A, R <sub>GEN</sub> =3.6Ω	-	11.8	-	ns
Rise Time	t <sub>r</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =45A, R <sub>GEN</sub> =3.6Ω	-	59.2	-	ns
Turn-Off Delay Time	T <sub>d(off)</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =45A, R <sub>GEN</sub> =3.6Ω	-	41.1	-	ns
Fall Time	t <sub>f</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =10V, I <sub>DS</sub> =45A, R <sub>GEN</sub> =3.6Ω	-	108.6	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q <sub>gs</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A,	-	9.82	-	nC
Gate charge at threshold	Q <sub>g(th)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A,	-	4.72	-	nC
Gate to Drain Charge	Q <sub>gd</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A,	-	13.9	-	nC
Switching charge	Q <sub>sw</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A,	-	19.0	-	nC
Gate charge total	Q <sub>g</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =20A, V <sub>GS</sub> =0 to 10V	-	55.7	-	nC
Gate plateau voltage	V <sub>plateau</sub>	V <sub>DD</sub> =50V	-	3.34	-	V
Gate charge total, sync. FET (Q <sub>g</sub> + Q <sub>gd</sub> )	Q <sub>g(sync)</sub>		-	41.8	-	nC

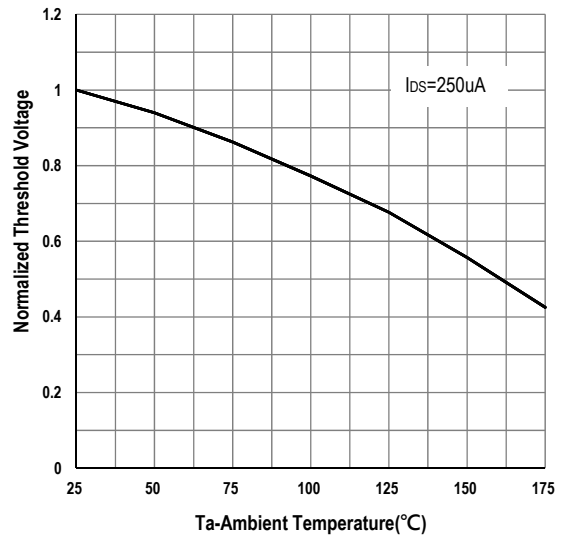
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A	-	0.85	1.3	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	55.6	-	ns
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	43.8	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	85.7	-	nC
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	129.1	-	nC
Reverse Recovery Current	I <sub>RRM</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	2.62	-	A
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	5.03	-	A

## Typical Operating Characteristics

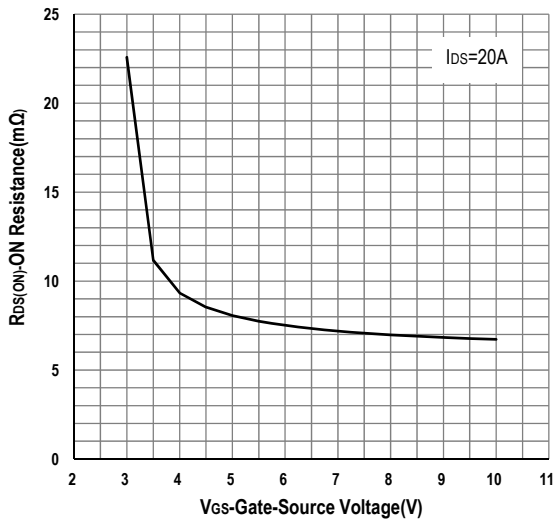
Output Characteristics



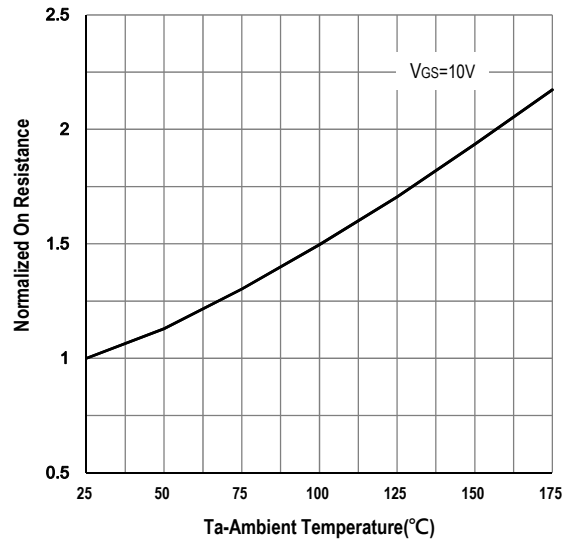
Gate Threshold Voltage



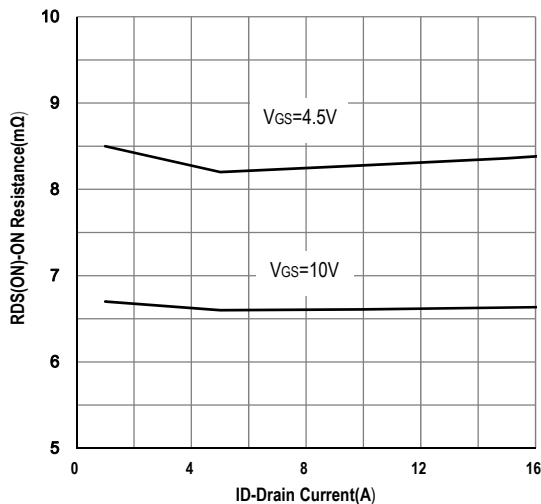
Gate-Source On Resistance



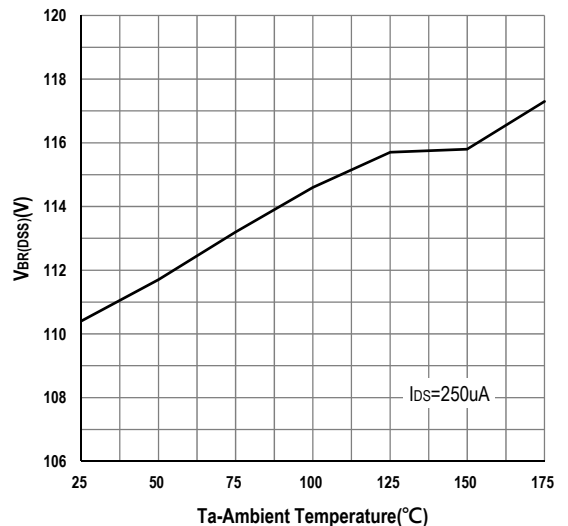
Drain-Source On Resistance



Drain-Source On Resistance

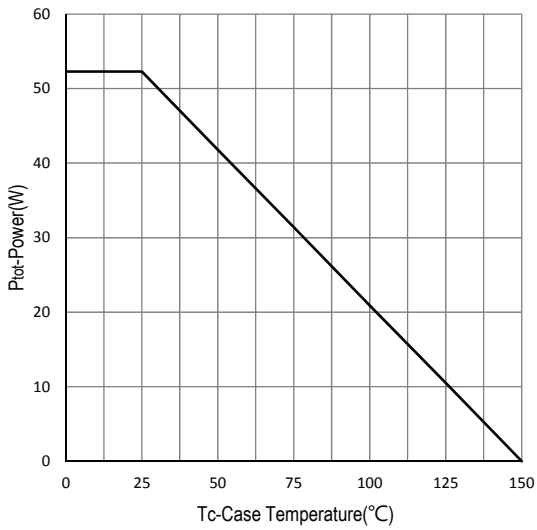


Drain-source Breakdown Voltage

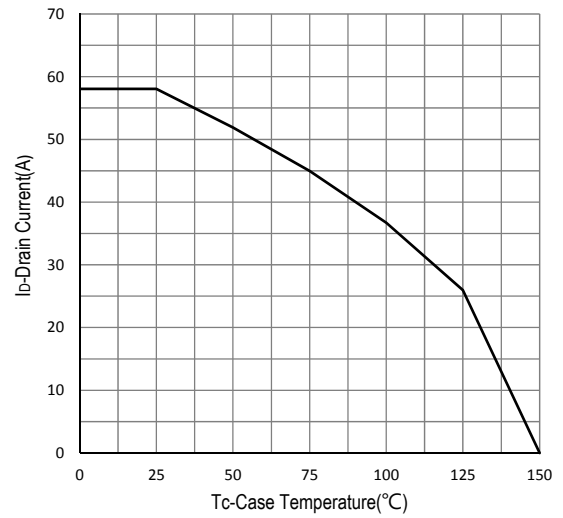


Typical Operating Characteristics (Cont.)

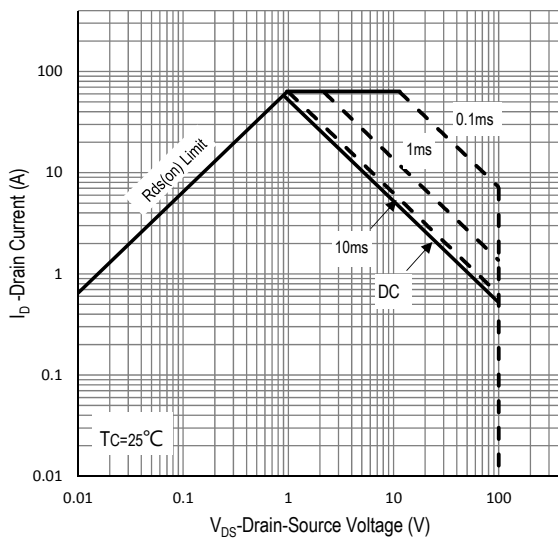
Power Dissipation



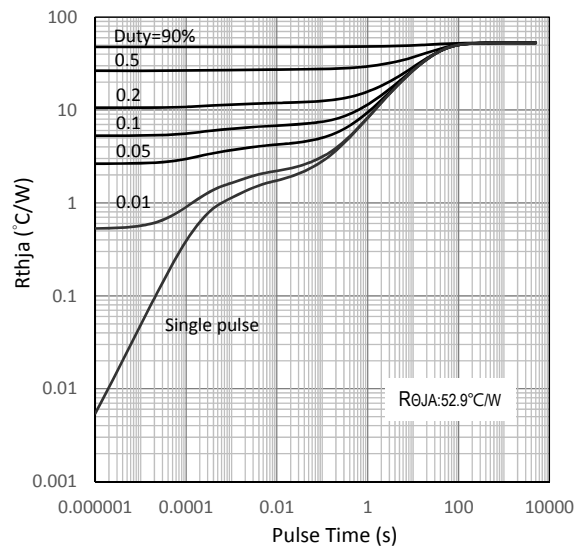
Drain Current



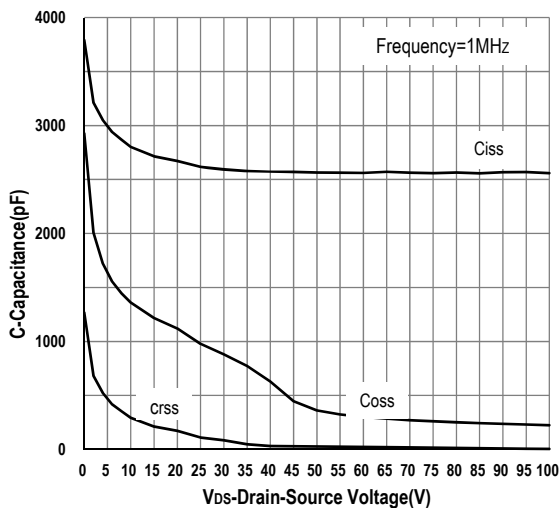
Safe Operation Area



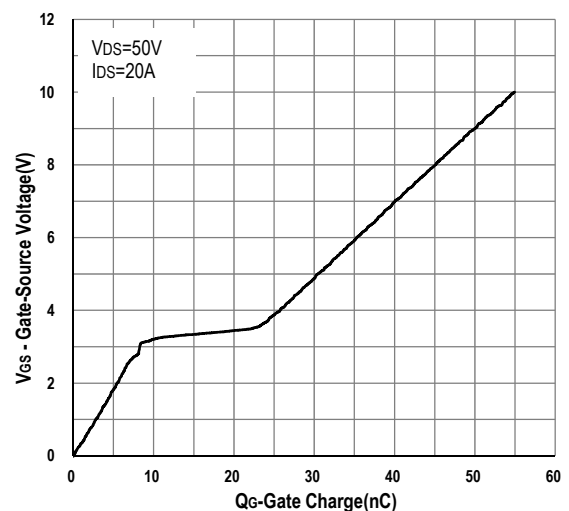
Transient Thermal Impedance



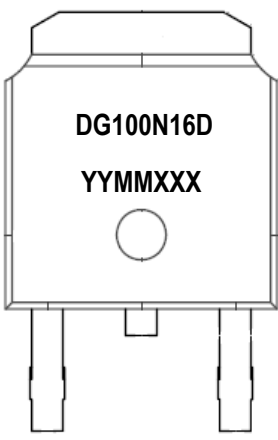
Capacitance



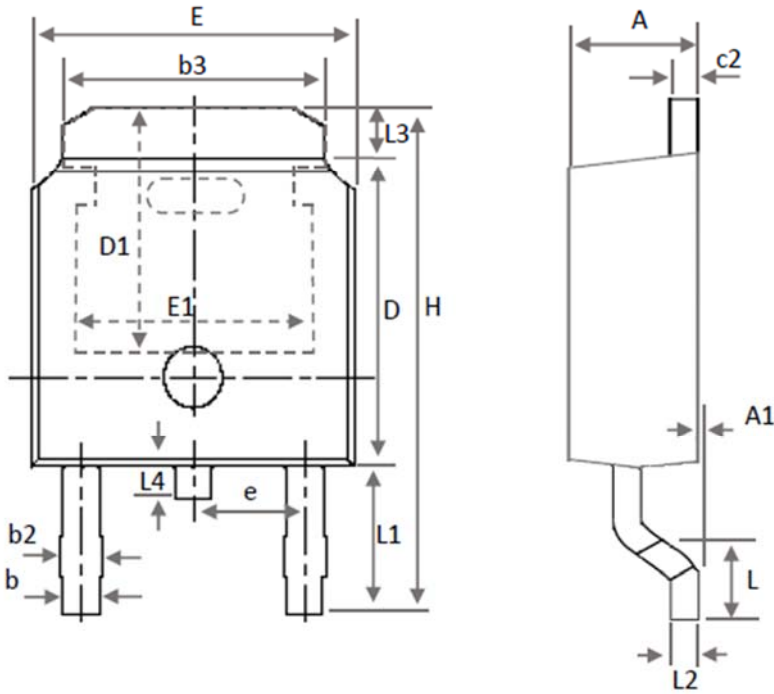
Gate Charge



## Marking Information

TO-252(D)	Marking Rule
<p>Laser Marking</p>  <p>DG100N16D YYMMXXX</p>	<p><u>Line 1</u> : Device DG100N16D</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

**Package of Dimension**

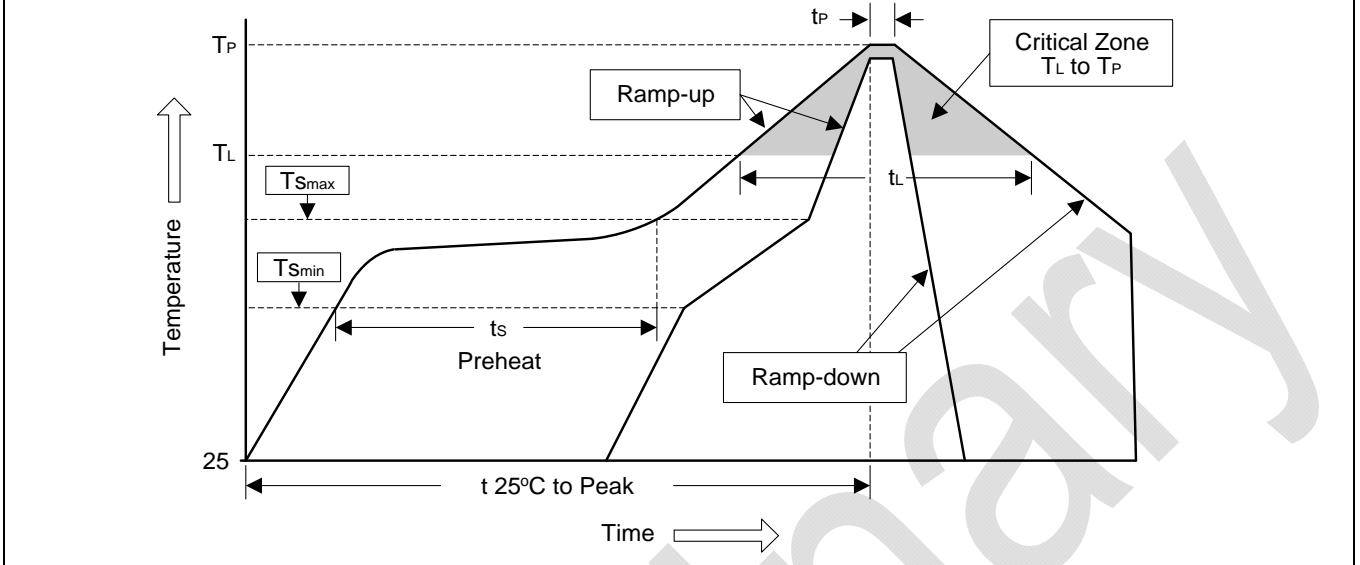


Symbol	Min	Nor	Max
E	6.35	6.54	6.731
L	1.40	1.59	1.78
L1	2.743 Ref.		
L2	0.508 BSC		
L3	0.89	1.08	1.27
L4	0.60	0.81	1.01
D	5.97	6.10	6.223
H	9.40	9.91	10.41
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	4.95	5.21	5.46
e	2.286 BSC		
A	2.18	2.29	2.39
A1	0.00	0.07	0.13
c2	0.46	0.68	0.89
D1	5.21	-	-
E1	4.32	-	-

## Soldering Methods for Silicongear's Products

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_L$ to $T_P$ )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	150°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60 to 120 sec	60 to 180 sec
$T_{Smax}$ to $T_L$		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature ( $T_L$ )	183°C	217°C
- Time ( $t_L$ )	60 to 150 sec	60 to 150 sec
Peak Temperature ( $T_P$ )	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_P$ )	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

### 3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

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