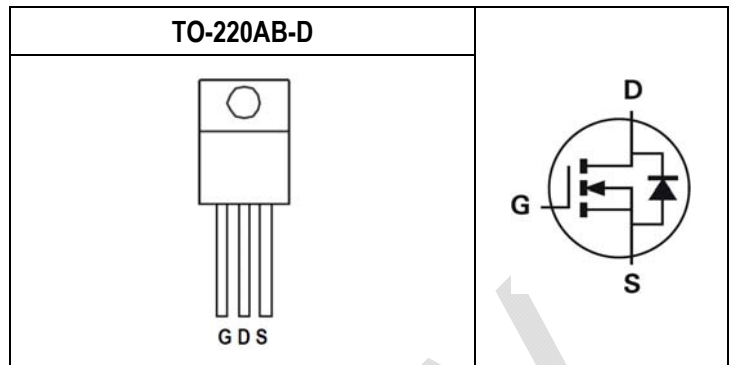


Key Performance Parameters		
Parameter	Value	Unit
V_{DS}	100	V
$R_{DS(ON) \text{ max. } V_{GS}=10V}$	8.9	m Ω
I_D	56	A
Q_g	50.8	nC
Q_{gd}	12.5	nC
Q_{SW}	17.2	nC



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

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG100N16PB	Halogen-Free	TO-220AB-D	PB	Tube	50

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}	± 20	V
Drain Current-Continuous	I_D	$T_C=25^\circ\text{C}$ <small>Note 4</small>	56
		$T_C=100^\circ\text{C}$	44
Drain Current-Pulsed <small>Note 1</small>	I_{DM}	86	A
Avalanche Current	I_{AR}	13	A
Single Pulse Avalanche Energy <small>Note 3</small>	E_{AS}	8.5	mJ
Maximum Power Dissipation	P_{tot}	83	W
Operating Junction Temperature Range	T_J	150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient <small>Note 2</small>	$R_{\theta JA}$	Steady State	-	40.7		$^\circ\text{C/W}$
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	1.49		$^\circ\text{C/W}$

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 $T_J=25^\circ\text{C}$, $V_D=50\text{V}$, $L=0.1\text{mH}$, $R_g=50\Omega$, $V_{GS}=10\text{V}$.
- The maximum current rating is package limited.

Electrical Characteristics (T_J=25°C unless otherwise noted)

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

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V _{GS(TH)}	V _{DS} =V _{GS} , I _{DS} =250μA	1.2	-	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =20A	-	-	8.9	mΩ
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V, I _{DS} =15A	-	-	12	mΩ
Gate Resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz	-	0.66	-	Ω
Forward Transconductance	g _{fs}	V _{DS} =5V, I _{DS} =20A	-	34	-	S

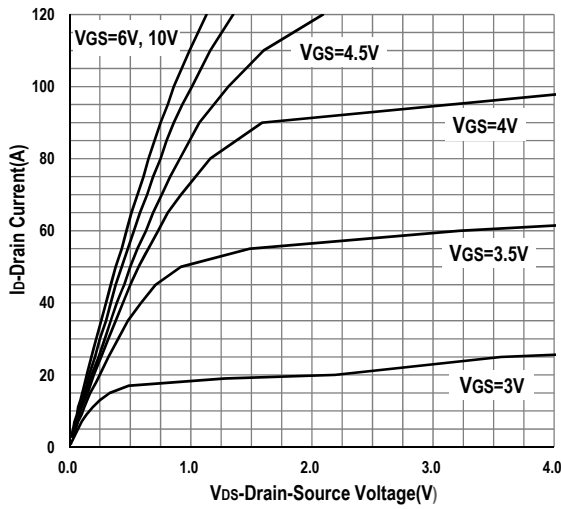
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, f=1MHz	-	2479	-	pF
Output Capacitance	C _{oss}	V _{DS} =50V, V _{GS} =0V, f=1MHz	-	360	-	pF
Reverse Transfer Capacitance	C _{rss}	V _{DS} =50V, V _{GS} =0V, f=1MHz	-	38	-	pF
Turn-On Delay Time	T _{d(on)}	V _{DS} =50V, V _{GS} =10V, I _{DS} =45A, R _{GEN} =3Ω	-	11.9	-	ns
Rise Time	t _r	V _{DS} =50V, V _{GS} =10V, I _{DS} =45A, R _{GEN} =3Ω	-	63.3	-	ns
Turn-Off Delay Time	T _{d(off)}	V _{DS} =50V, V _{GS} =10V, I _{DS} =45A, R _{GEN} =3Ω	-	38.7	-	ns
Fall Time	t _f	V _{DS} =50V, V _{GS} =10V, I _{DS} =45A, R _{GEN} =3Ω	-	120.7	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q _{gs}	V _{DD} =50V, I _D =20A	-	9.42	-	nC
Gate charge at threshold	Q _{g(th)}	V _{DD} =50V, I _D =20A	-	4.76	-	nC
Gate to Drain Charge	Q _{gd}	V _{DD} =50V, I _D =20A	-	12.5	-	nC
Switching charge	Q _{sw}	V _{DD} =50V, I _D =20A	-	17.2	-	nC
Gate charge total	Q _g	V _{DD} =50V, I _D =20A, V _{GS} =0 to 10V	-	50.8	-	nC
Gate plateau voltage	V _{plateau}	V _{DD} =50V	-	3.4	-	V
Gate charge total, sync. FET (Q _g - Q _{gd})	Q _{g(sync)}		-	38.2	-	nC

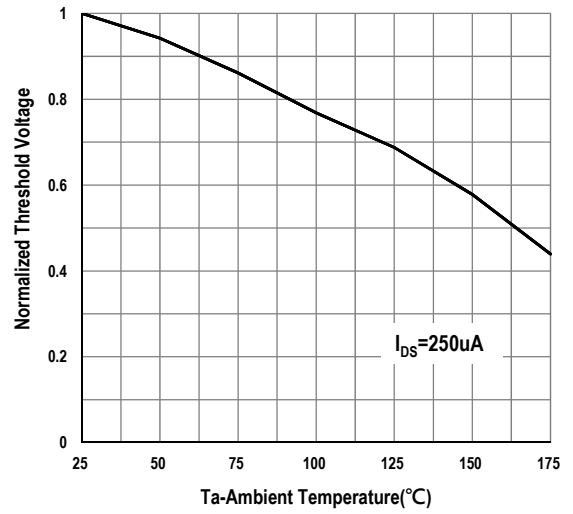
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _F =20A	-	0.7	1.3	V
Body Diode Reverse Recovery Time	t _{rr}	V _{DD} =50V, I _F =20A, di/dt=100A/μs	-	49.0	-	ns
		V _{DD} =50V, I _F =20A, di/dt=200A/μs	-	43.8	-	ns
Body Diode Reverse Recovery Charge	Q _{rr}	V _{DD} =50V, I _F =20A, di/dt=100A/μs	-	61.8	-	nC
		V _{DD} =50V, I _F =20A, di/dt=200A/μs	-	121.1	-	nC
Reverse Recovery Current	I _{RRM}	V _{DD} =50V, I _F =20A, di/dt=100A/μs	-	2.30	-	A
		V _{DD} =50V, I _F =20A, di/dt=200A/μs	-	4.68	-	A

Typical Operating Characteristics

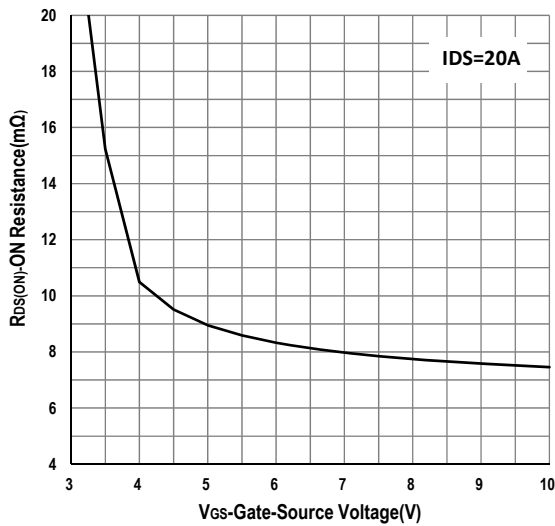
Output Characteristics



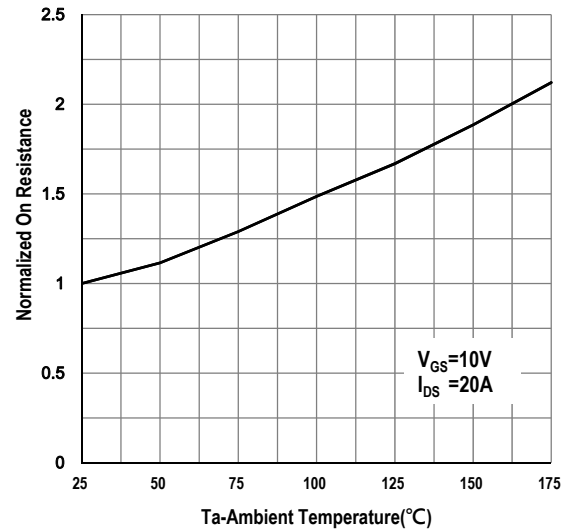
Gate Threshold Voltage



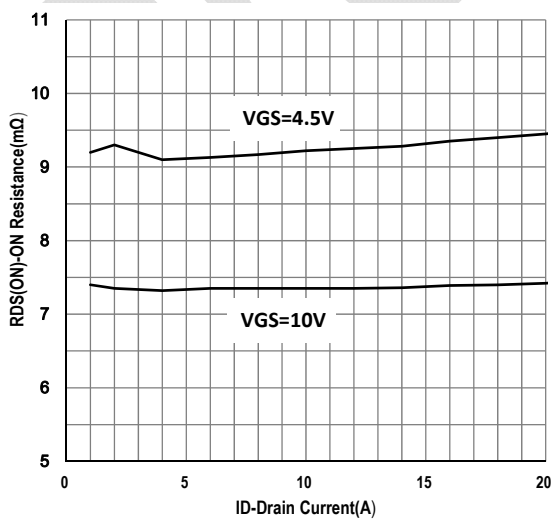
Gate-Source On Resistance



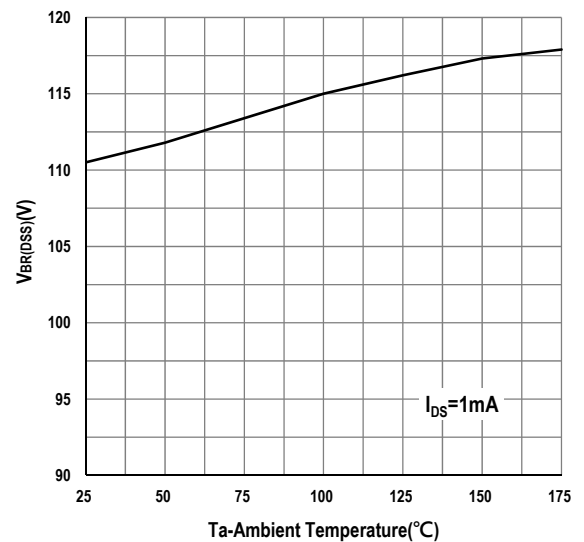
Drain-Source On Resistance



Drain-Source On Resistance

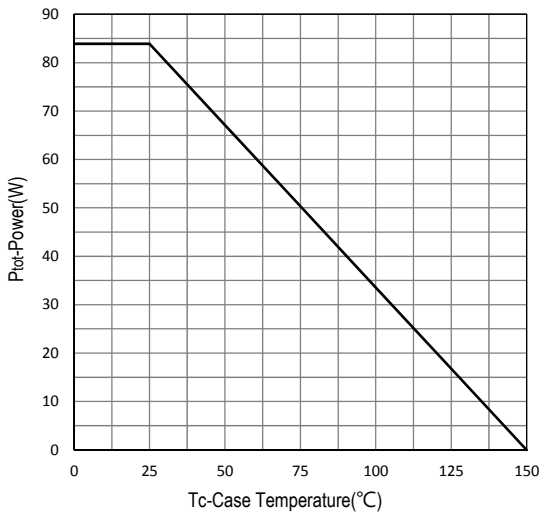


Drain-source Breakdown Voltage

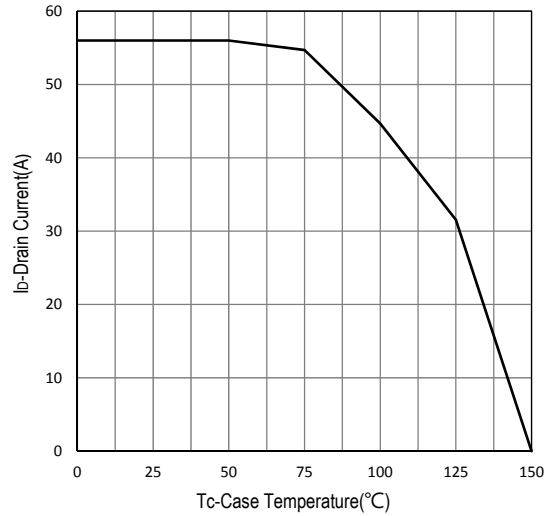


Typical Operating Characteristics (Cont.)

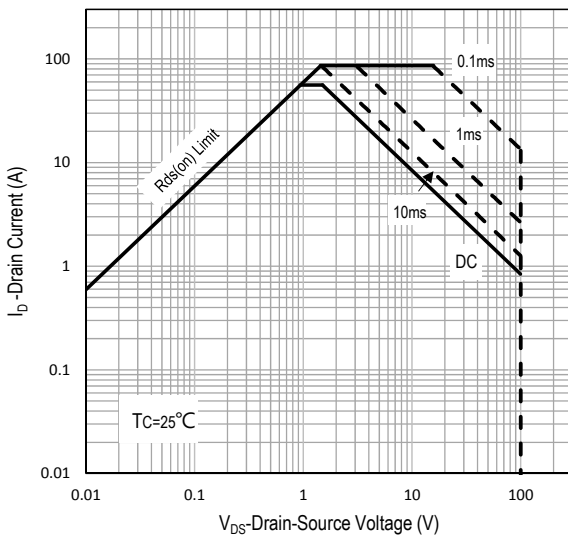
Power Dissipation



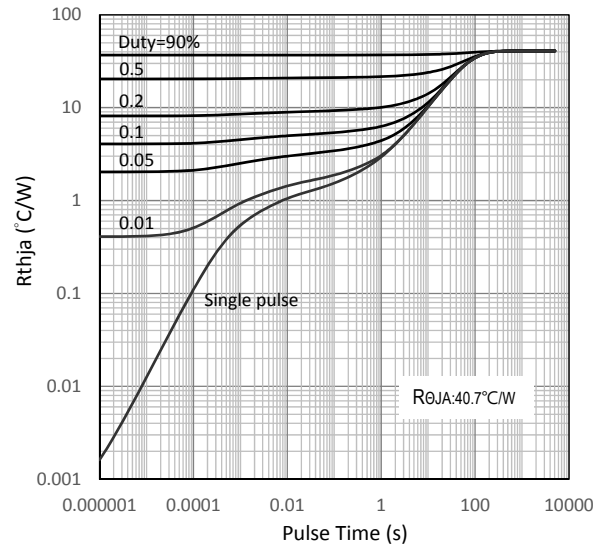
Drain Current



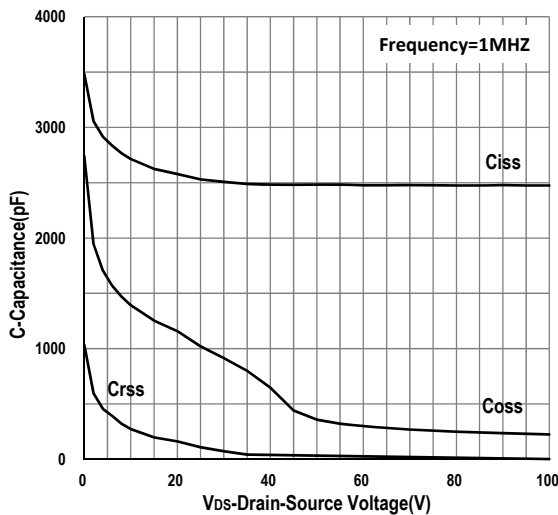
Safe Operation Area



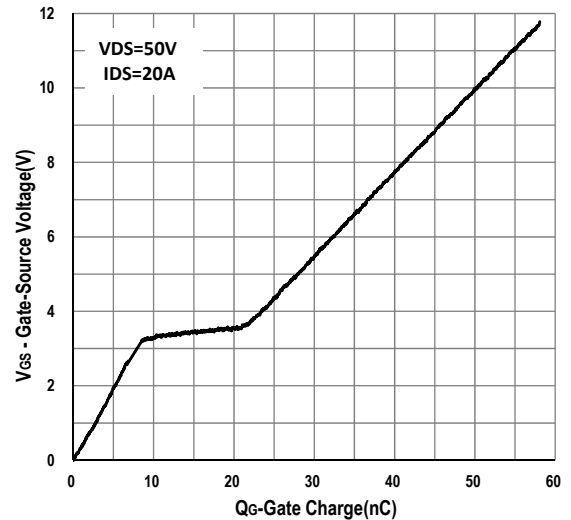
Transient Thermal Impedance



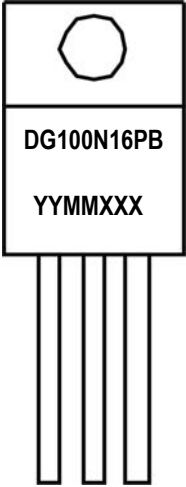
Capacitance



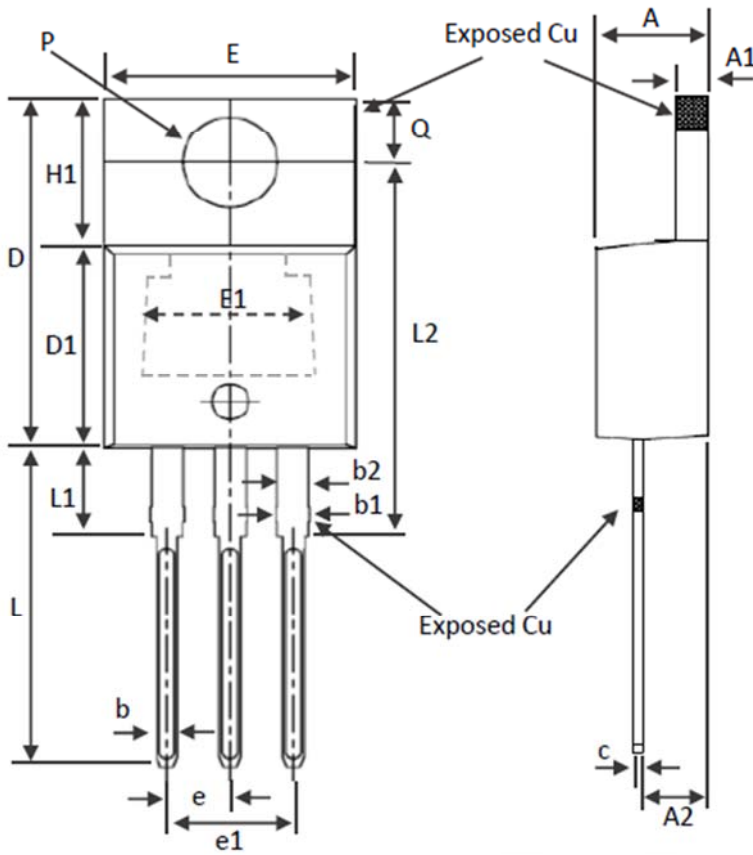
Gate Charge



Marking Information

TO-220AB-D (PB)	Marking Rule
<p>Laser Marking</p> 	<p><u>Line 1</u> : Device DG100N16PB</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

Package of Dimension

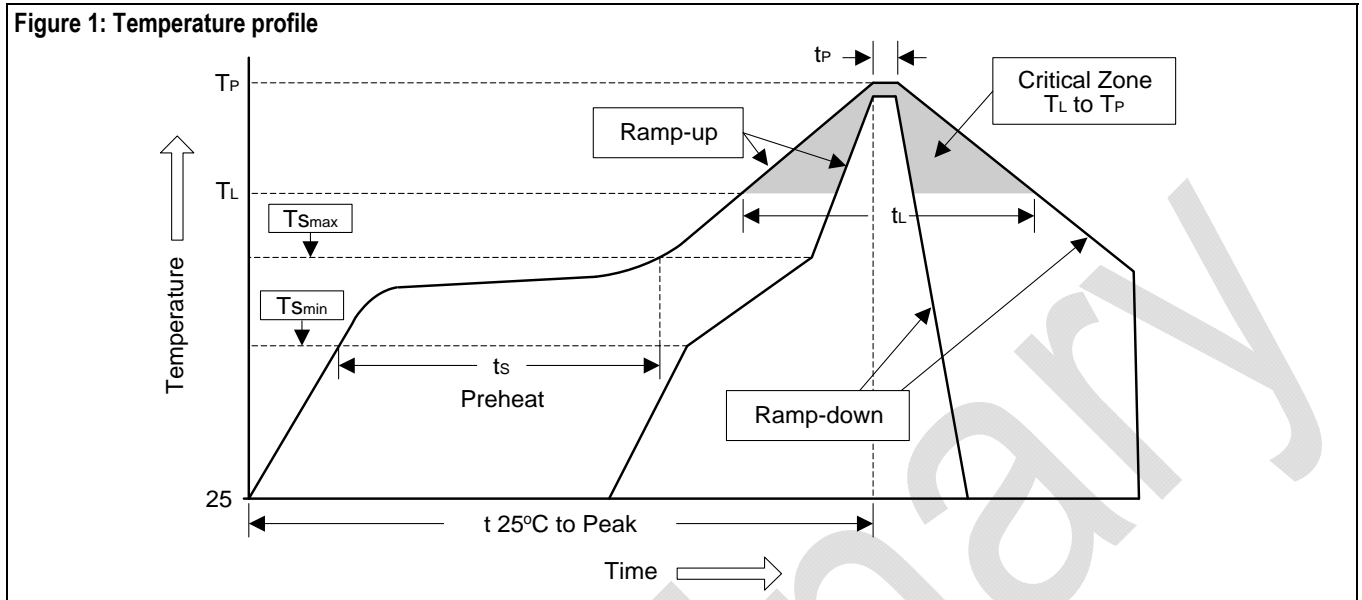


Symbol	Min	Nor	Max
A	3.56	4.57	4.82
A1	0.51	1.27	1.39
A2	2.04	2.67	2.92
b	0.39	0.81	1.01
b1	1.15	1.37	1.82
b2	1.15	1.27	1.77
D	14.22	15.00	16.51
D1	8.39	8.70	9.01
D2	11.45	11.94	12.87
E	9.66	10.11	10.66
E1	6.86	7.00	8.89
e	2.54 Ref.		
e1	5.08 Ref.		
H1	5.85	6.30	6.85
L	12.70	13.60	14.73
L1	-	3.75	6.35
L2	15.80	16.00	16.20
P	3.54	3.87	4.08
Q	2.54	2.74	3.42

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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