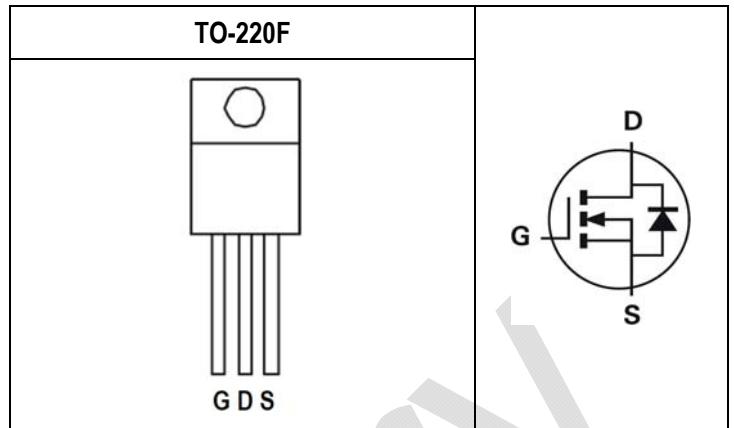


Key Performance Parameters		
Parameter	Value	Unit
$V_{DSS}$	100	V
$R_{DS(ON) \max.} V_{GS}=10V$	5.1	m $\Omega$
$I_D$	60	A
$Q_g$	76.2	nC
$Q_{gd}$	20.3	nC
$Q_{SW}$	27.2	nC



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
DG100N15F	Halogen-Free	TO-220F	F	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	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	$T_C=25^\circ\text{C}$	60
		$T_C=100^\circ\text{C}$	38
Drain Current-Pulsed <sup>Note 1</sup>	$I_{DM}$	110	A
Avalanche Current	$I_{AR}$	23	A
Single Pulse Avalanche Energy <sup>Note 3</sup>	$E_{AS}$	26	mJ
Maximum Power Dissipation	$P_{tot}$	40	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 <sup>Note 2</sup>	$R_{\theta JA}$	Steady State	-	60.3	-	$^\circ\text{C/W}$
Thermal resistance, Junction-to-Case <sup>Note 2</sup>	$R_{\theta JC}$	Steady State	-	3.08	-	$^\circ\text{C/W}$

### 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  $T_J=25^\circ\text{C}$ ,  $L=0.1\text{mH}$ ,  $R_g=50\Omega$ ,  $V_{GS}=10\text{V}$ .

## 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> =80V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	-	-	10	μA
		V <sub>DS</sub> =80V, 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> =50A	-	-	5.1	mΩ
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A	-	-	6.9	mΩ
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz	-	0.88	-	Ω
Forward Transconductance	g <sub>fs</sub>	V <sub>DS</sub> =5V, I <sub>DS</sub> =20A	-	40.8	-	S

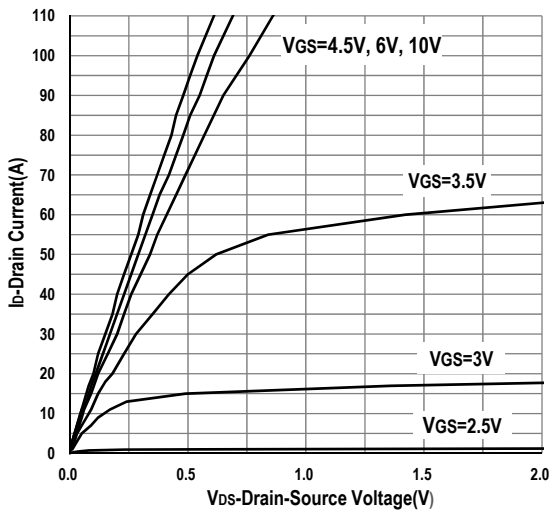
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	3741	-	pF
Output Capacitance	C <sub>oss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	573	-	pF
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>DS</sub> =50V, V <sub>GS</sub> =0V, f=1MHz	-	41	-	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	-	14.4	-	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	-	68.4	-	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	-	54.4	-	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	-	112.0	-	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> =30A	-	14.0	-	nC
Gate charge at threshold	Q <sub>g(th)</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A	-	7.13	-	nC
Gate to Drain Charge	Q <sub>gd</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A	-	20.3	-	nC
Switching charge	Q <sub>sw</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A	-	27.2	-	nC
Gate charge total	Q <sub>g</sub>	V <sub>DD</sub> =50V, I <sub>D</sub> =30A, V <sub>GS</sub> =0 to 10V	-	76.2	-	nC
Gate plateau voltage	V <sub>plateau</sub>	V <sub>DD</sub> =50V	-	3.49	-	V
Gate charge total, sync. FET (Q <sub>g</sub> - Q <sub>gd</sub> )	Q <sub>g(sync)</sub>		-	55.9	-	nC

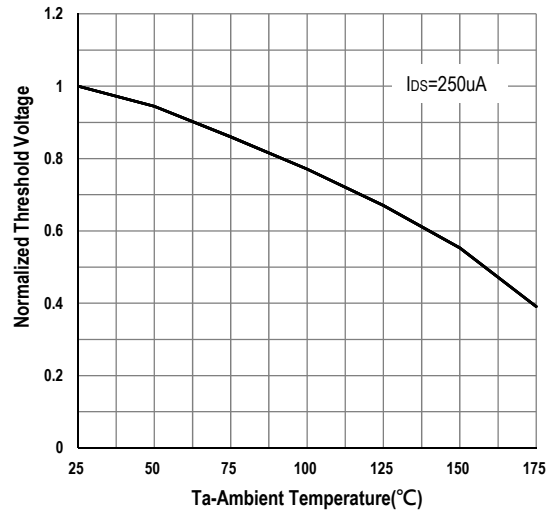
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>F</sub> =20A	-	0.7	1.3	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	54.0	-	ns
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	48.2	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	73.7	-	nC
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	142.9	-	nC
Reverse Recovery Current	I <sub>RRM</sub>	V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=100A/μs	-	2.39	-	A
		V <sub>DD</sub> =50V, I <sub>F</sub> =20A, di/dt=200A/μs	-	5.06	-	A

## Typical Operating Characteristics

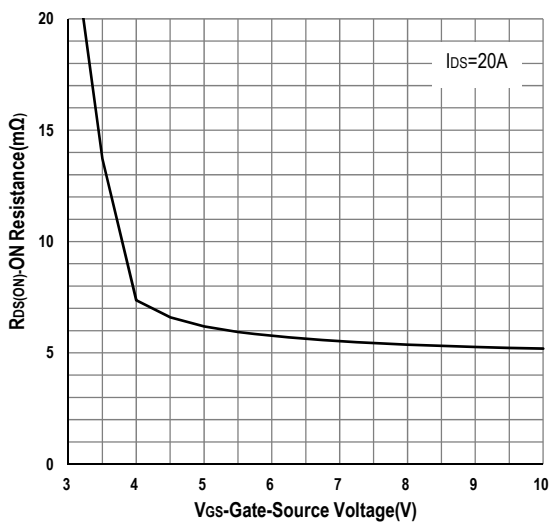
Output Characteristics



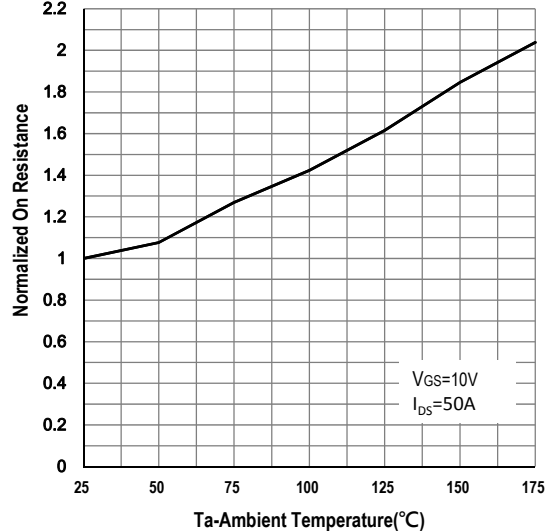
Gate Threshold Voltage



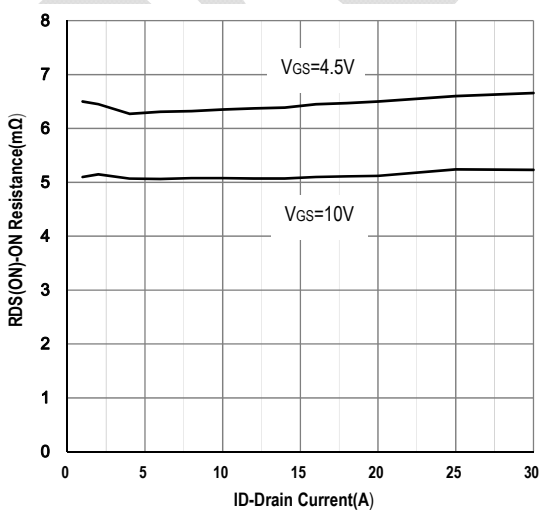
Gate-Source On Resistance



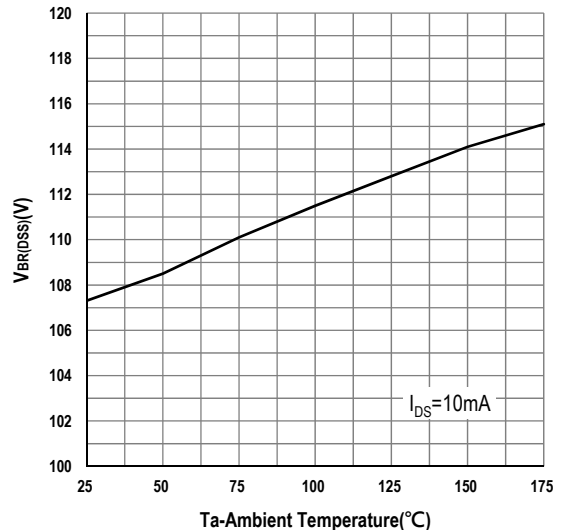
Drain-Source On Resistance



Drain-Source On Resistance

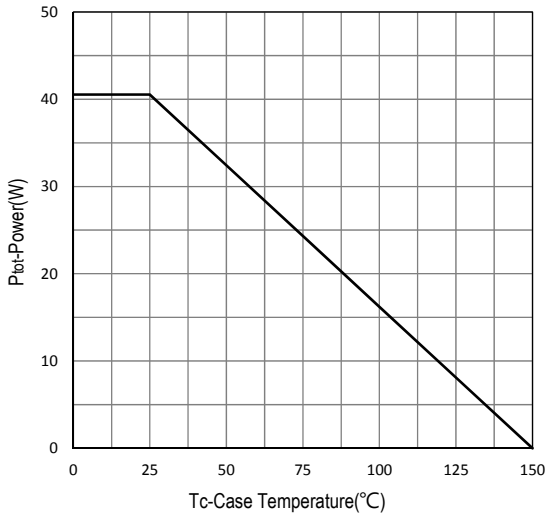


Drain-source Breakdown Voltage

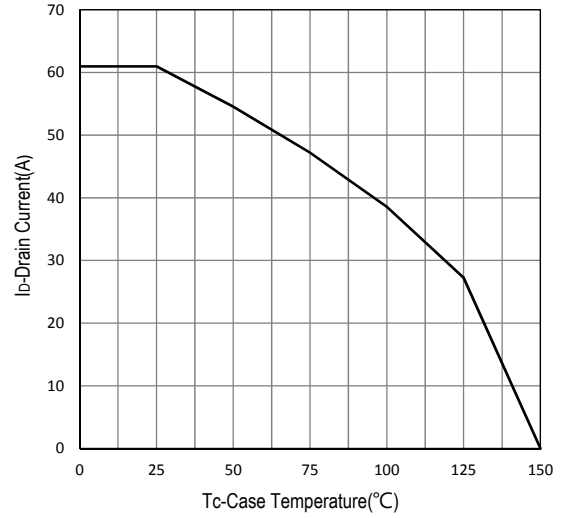


## Typical Operating Characteristics (Cont.)

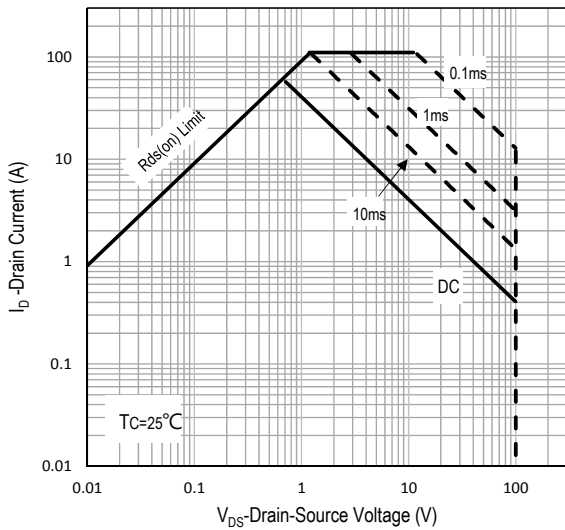
**Power Dissipation**



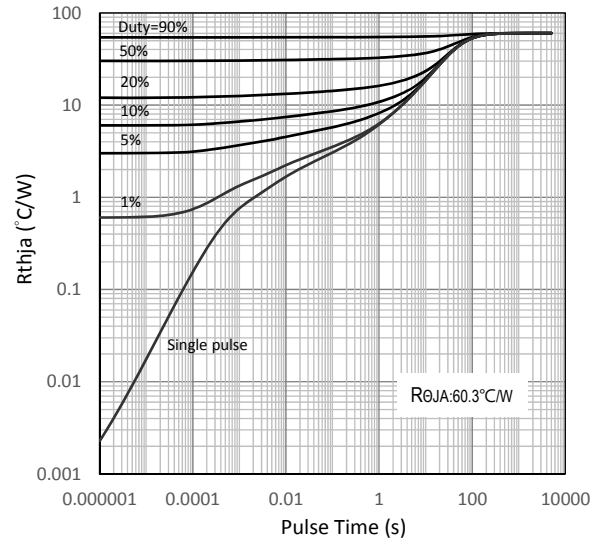
**Drain Current**



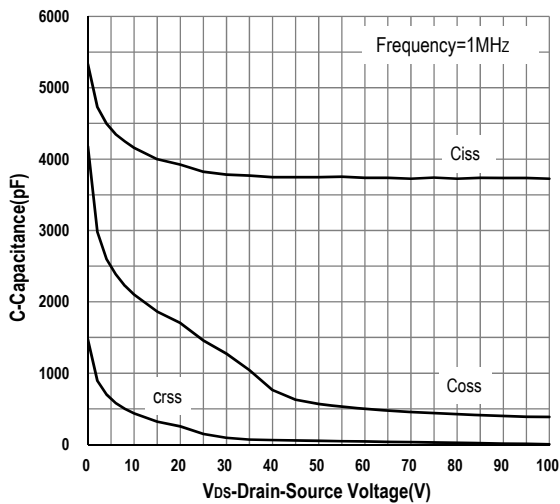
**Safe Operation Area**



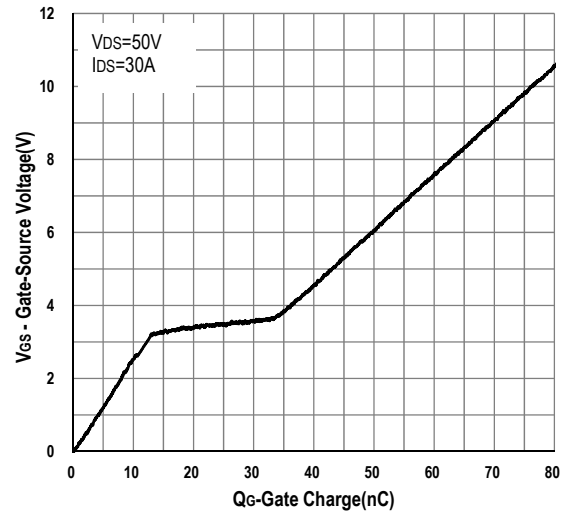
**Transient Thermal Impedance**



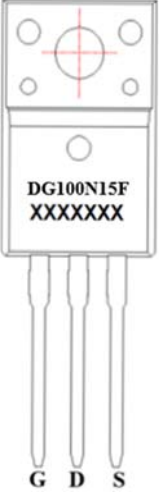
**Capacitance**



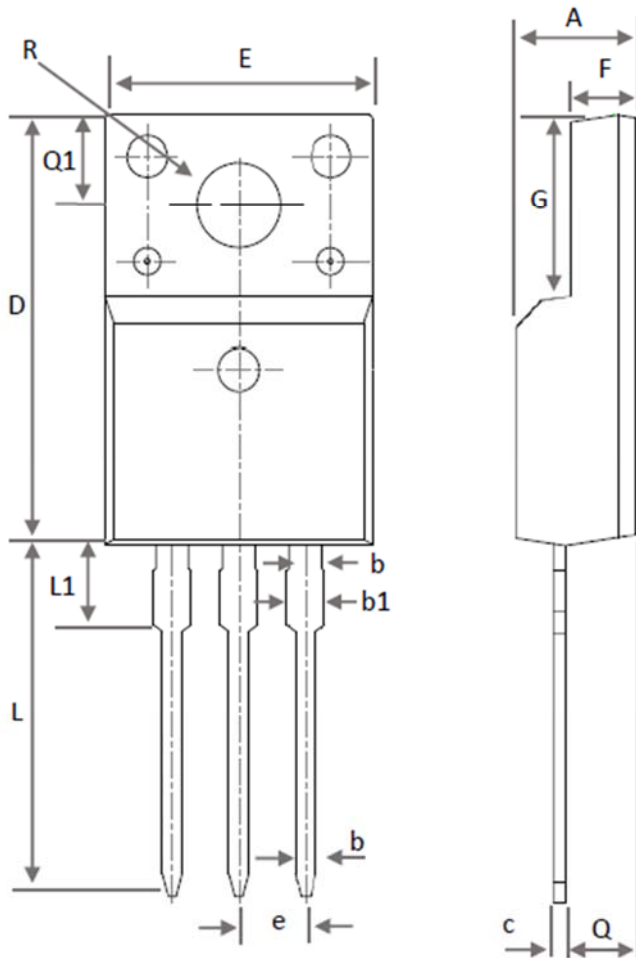
**Gate Charge**



**Marking Information**

TO-220F (F)	Marking Rule
<p>Laser Marking</p> 	<p><u>Line 1</u> : Device DG100N15F</p> <p><u>Line 2</u> : Date Code YYMMXXX</p> <p>YY : Year Code MM : Month Code XXX : Serial Number</p>

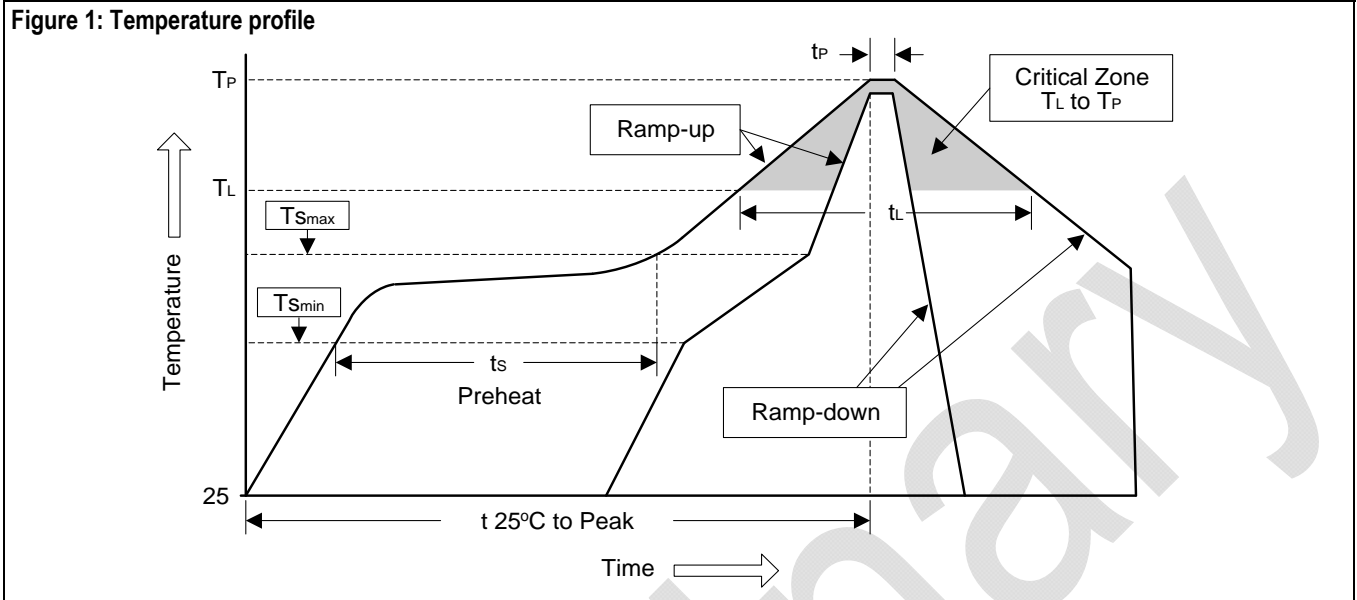
**Package of Dimension**



Symbol	Min	Nor	Max
A	4.50	4.67	4.83
b	0.70	0.81	0.91
b1	1.20	1.34	1.47
b2	1.10	1.24	1.38
C	0.40	0.52	0.63
D	15.67	15.87	16.07
e	2.54 BSC		
E	9.96	10.16	10.36
F	2.34	2.54	2.74
G	6.48	6.69	6.90
L	12.68	12.99	13.30
L1	3.13	3.32	3.50
Q	2.54	2.74	2.93
Q1	3.20	3.30	3.40
R	3.08	3.18	3.28

## 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



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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