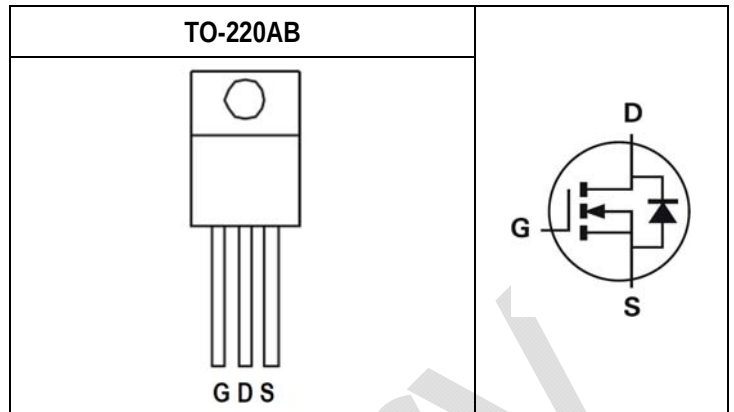


Key Performance Parameters		
Parameter	Value	Unit
V_{DS}	80	V
$R_{DS(ON) \max.} V_{GS}=10V$	3.6	mΩ
I_D	120	A
Q_g	71.8	nC
Q_{gd}	26.7	nC
Q_{SW}	33.8	nC



Features	Application
- Optimized for synchronous rectification Low Input Capacitance - Low Switching Charge - Low Miller Capacitance - Fully Characterized Capacitance and Avalanche - Pb-free lead plating; RoHS compliant	- BLDC Motor drive applications - Battery powered circuits - Half-bridge and full-bridge topologies - Synchronous rectifier applications - Resonant mode power supplies

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
DG80N05HP	Halogen-Free	TO-220AB	P	Tube	50

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	80	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous ^{Note 4}	$T_C=25^\circ\text{C}$	120	A
	$T_C=100^\circ\text{C}$	120	A
Drain Current-Pulsed ^{Note 1}	$T_C=25^\circ\text{C}$	I_{DM}	243 A
Avalanche Current ^{Note 3}	I_{AR}	44	A
Single Pulse Avalanche Energy ^{Note 3}	E_{AS}	96	mJ
Maximum Power Dissipation	$T_C=25^\circ\text{C}$	P_{tot}	223 W
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Thermal resistance, Junction-to-Ambient ^{Note 2}	$R_{\theta JA}$	Steady State	-	45.3		$^\circ\text{C/W}$
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	0.56		$^\circ\text{C/W}$

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 $T_J=25^\circ\text{C}$, $V_D=40\text{V}$, $L=0.1\text{mH}$, $V_{GS}=10\text{V}$, Rated $V_{DS}=80\text{V}$ N-CH.
- Limited by package.

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

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_{DS}=1mA$	80	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=64V, V_{GS}=0V, T_J=25^{\circ}C$	-	-	10	μA
		$V_{DS}=64V, V_{GS}=0V, T_J=125^{\circ}C$	-	-	100	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA

STATIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.3	3.2	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_{DS}=50A$	-	-	3.6	m Ω
Gate Resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1MHz$	-	0.5	1	Ω
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_{DS}=20A$	-	13	-	S

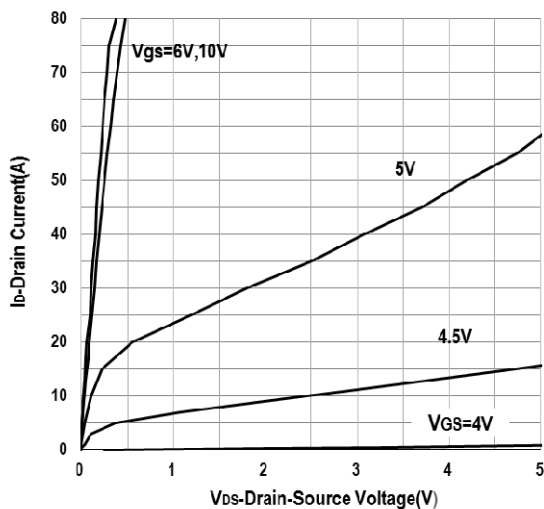
DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	$V_{DS}=40V, V_{GS}=0V, f=1MHz$	-	3732	-	pF
Output Capacitance	C_{oss}	$V_{DS}=40V, V_{GS}=0V, f=1MHz$	-	1187	-	pF
Reverse Transfer Capacitance	C_{rss}	$V_{DS}=40V, V_{GS}=0V, f=1MHz$	-	49	-	pF
Turn-On Delay Time	$T_{d(on)}$	$V_{DS}=40V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3.6\Omega$	-	17.8	-	ns
Rise Time	t_r	$V_{DS}=40V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3.6\Omega$	-	34.9	-	ns
Turn-Off Delay Time	$T_{d(off)}$	$V_{DS}=40V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3.6\Omega$	-	39.7	-	ns
Fall Time	t_f	$V_{DS}=40V, V_{GS}=10V, I_{DS}=20A, R_{GEN}=3.6\Omega$	-	25.6	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate to Source Gate Charge	Q_{gs}	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	18.7	-	nC
Gate charge at threshold	$Q_{g(th)}$	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	11.6	-	nC
Gate to Drain Charge	Q_{gd}	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	26.7	-	nC
Switching charge	Q_{SW}	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	33.8	-	nC
Gate charge total	Q_g	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	71.8	-	nC
Gate charge total	Q_g	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 4.5V$	-	25.5	-	nC
Gate plateau voltage	$V_{plateau}$	$V_{DD}=40V, I_D=20A, V_{GS}=0 \text{ to } 10V$	-	5.1	-	V
Gate charge total, sync. FET ($Q_g - Q_{gd}$)	$Q_{g(sync)}$	$V_{DS}=0.1V, V_{GS}=0 \text{ to } 10V$	-	45.2	-	nC

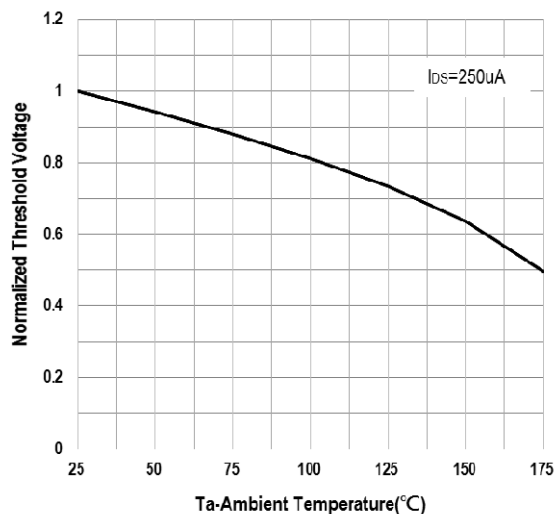
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=1A$	-	0.7	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	$V_{DD}=40V, I_F=20A, di/dt=100A/\mu s$	-	66.3	-	ns
		$V_{DD}=40V, I_F=20A, di/dt=200A/\mu s$	-	51.2	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	$V_{DD}=40V, I_F=20A, di/dt=100A/\mu s$	-	101.8	-	nC
		$V_{DD}=40V, I_F=20A, di/dt=200A/\mu s$	-	137.9	-	nC
Reverse Recovery Current	I_{RRM}	$V_{DD}=40V, I_F=20A, di/dt=100A/\mu s$	-	2.68	-	A
		$V_{DD}=40V, I_F=20A, di/dt=200A/\mu s$	-	4.44	-	A

Typical Operating Characteristics

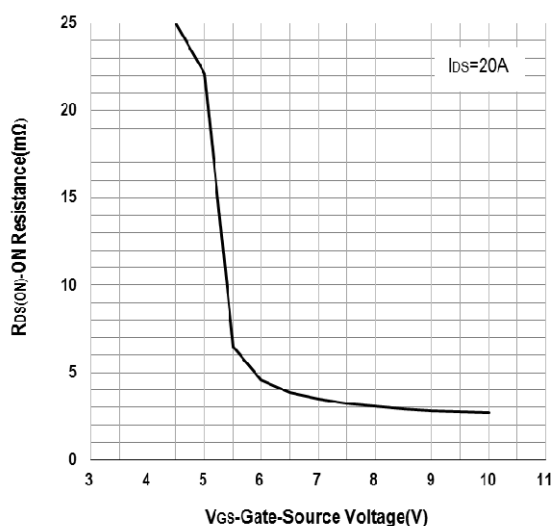
Output Characteristics



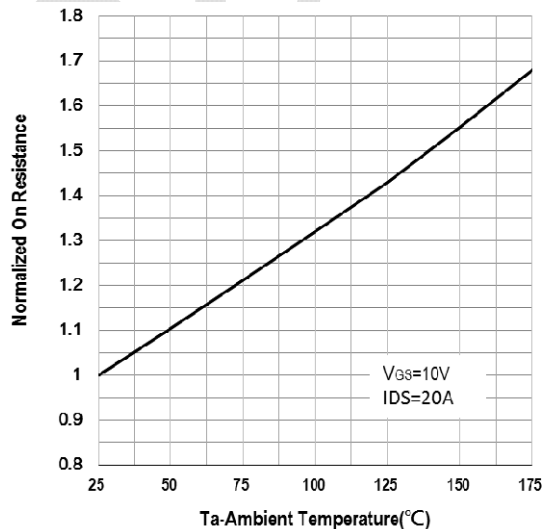
Gate Threshold Voltage



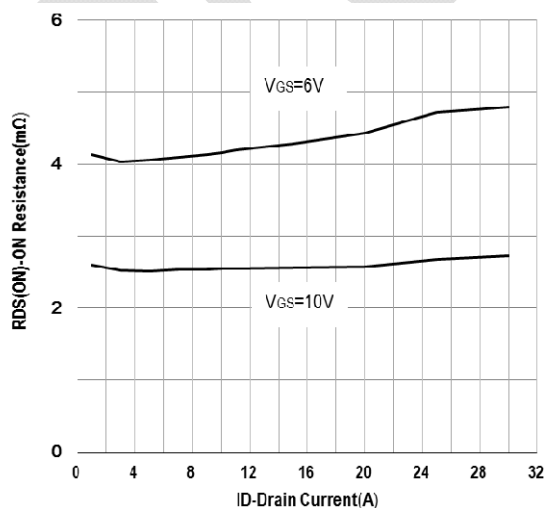
Gate-Source On Resistance



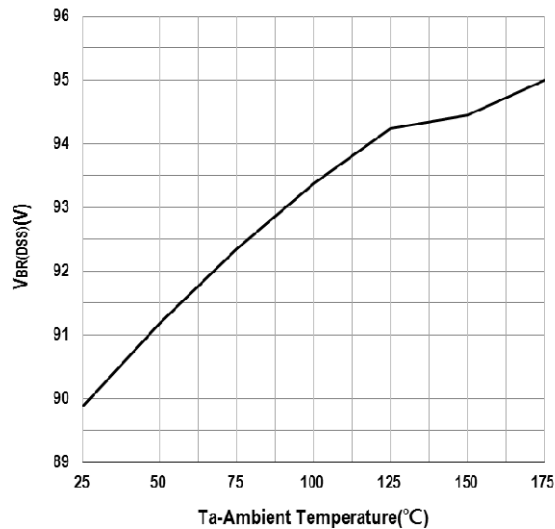
Drain-Source On Resistance



Drain-Source On Resistance

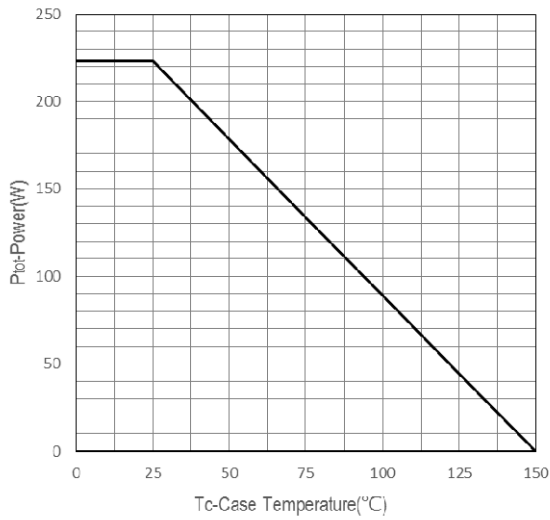


Drain-source Breakdown Voltage

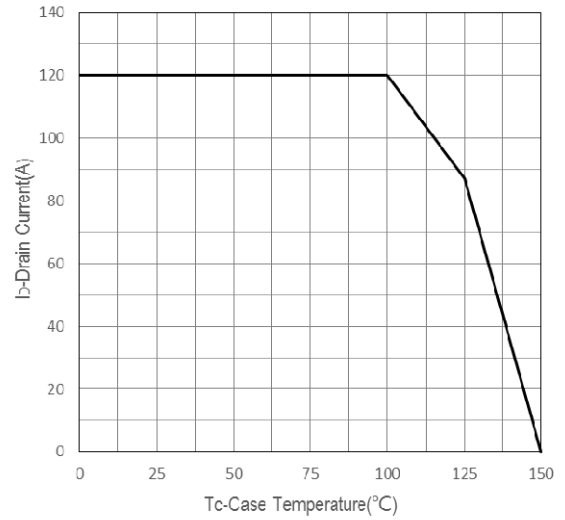


Typical Operating Characteristics (Cont.)

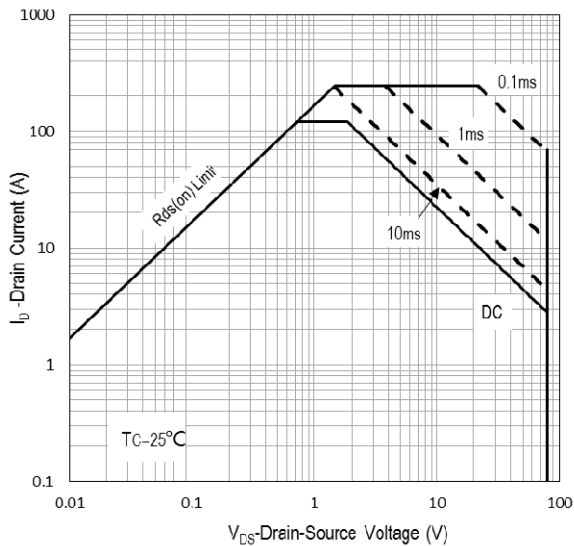
Power Dissipation



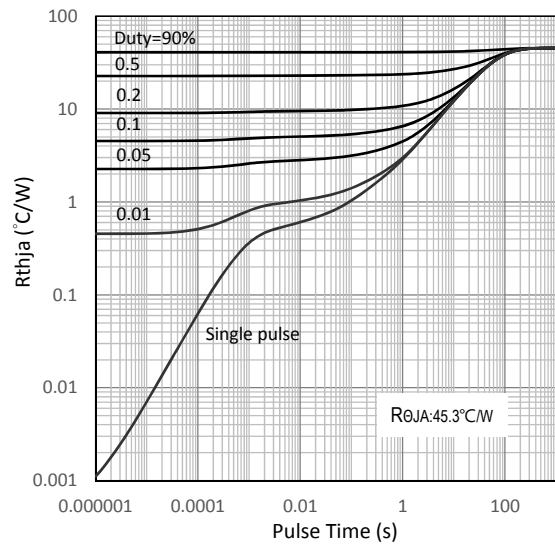
Drain Current



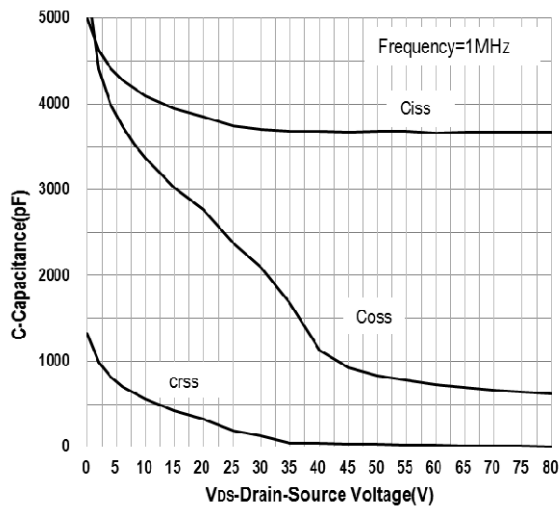
Safe Operation Area



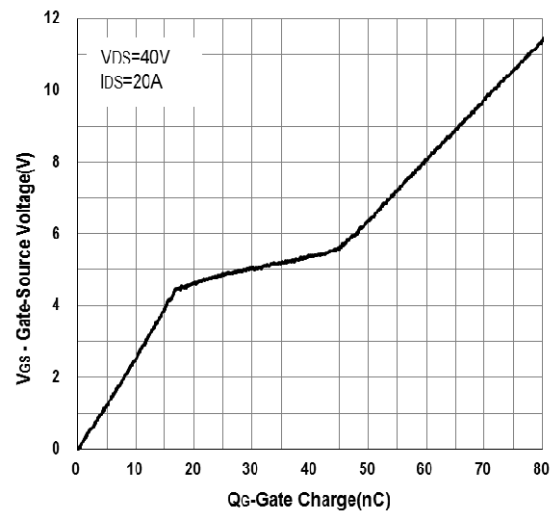
Transient Thermal Impedance



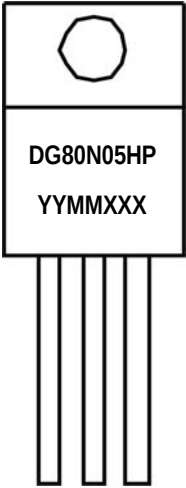
Capacitance



Gate Charge

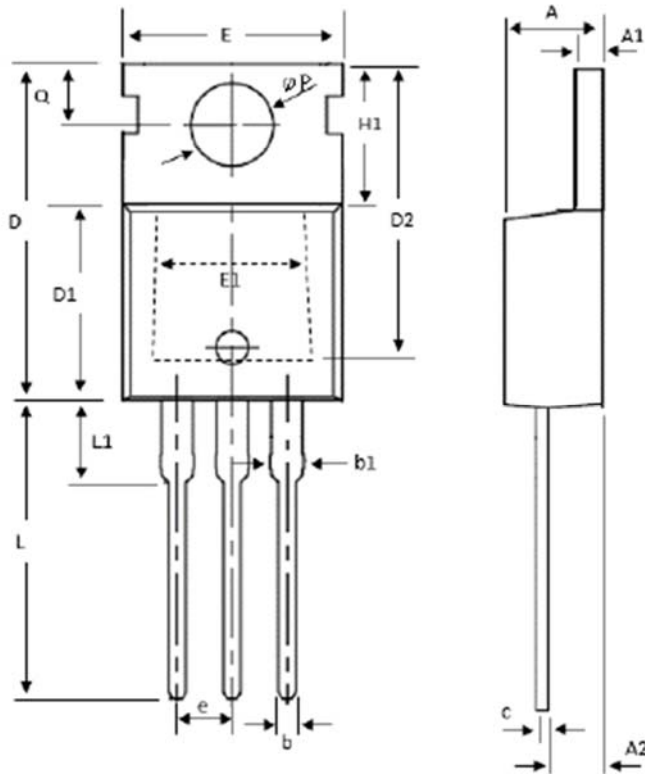


Marking Information

TO-220AB (P)	Marking Rule
Laser Marking 	<u>Line 1</u> : Device DG80N05HP <u>Line 2</u> : Date Code YYMMXXX YY : Year Code MM : Month Code XXX : Serial Number

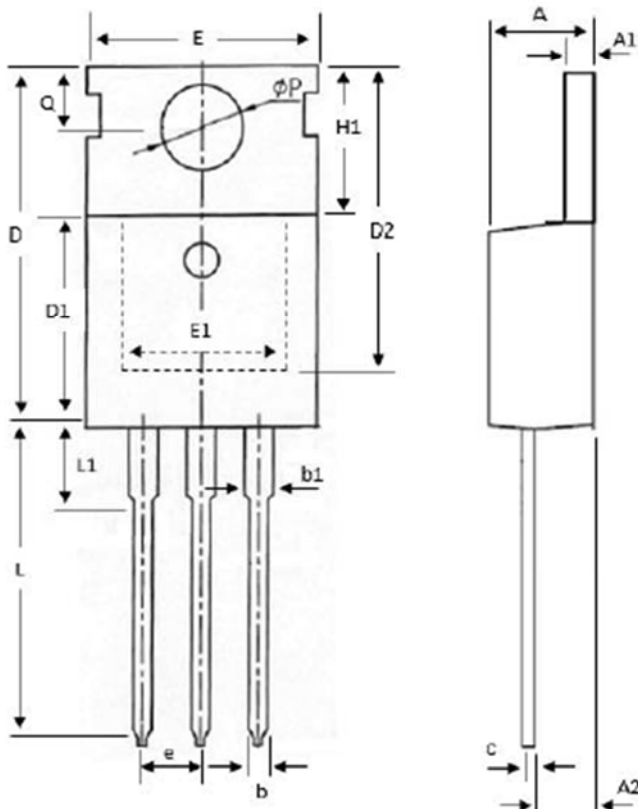
Package of Dimension

G-TYPE



Symbol	Min	Nor	Max
A	4.20	4.45	4.70
A1	1.15	1.28	1.40
A2	2.20	2.45	2.70
b	0.70	0.83	0.95
b1	1.15	1.45	1.75
c	0.40	0.50	0.60
D1	8.80	9.10	9.40
D2	11.75	-	-
E	9.70	10.03	10.36
E1	6.86	-	-
e	2.54 BSC		
H1	6.25	6.55	6.85
L	12.75	13.38	14.00
L1	-	-	4.00
P	3.40	3.70	4.00
Q	2.60	2.80	3.00

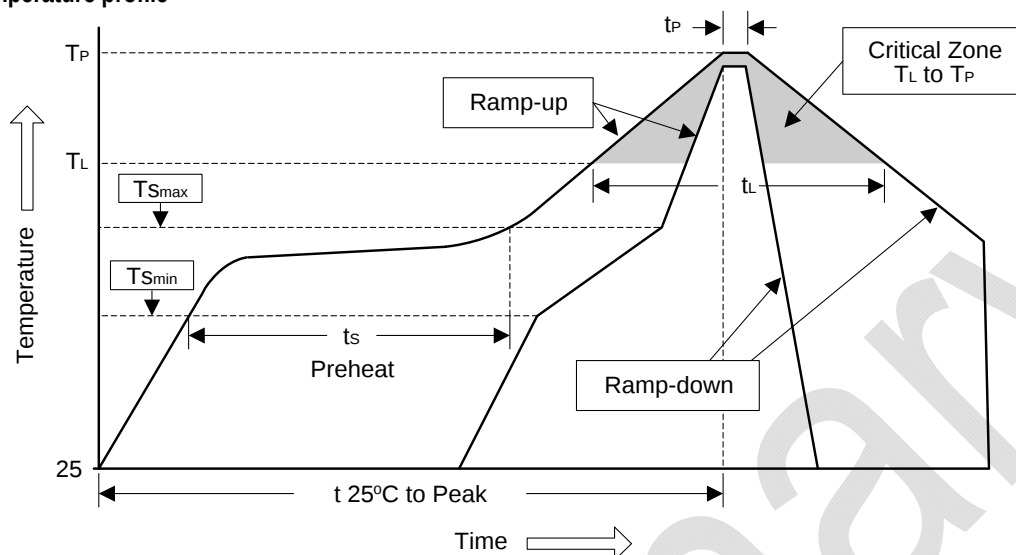
P-TYPE
H-TYPE



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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