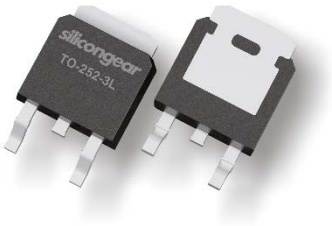
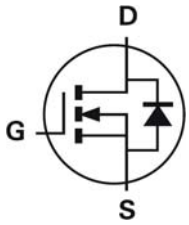
DG80N02D

DG-FET™ 80V N-Channel Power MOSFET

Parameter	Value	Unit
V_{DSS}	80	V
$R_{DS(ON)\ max.}$ V_{GS}=10V	6.9	mΩ
$R_{DS(ON)\ max.}$ V_{GS}=4.5V	8.8	mΩ
I_D	60	A
Q_g	41.75	nC
Q_{gd}	7.7	nC
Q_{SW}	10.05	nC

TO-252





Features	Application
• Optimized for synchronous rectification Low Input Capacitance • Low Miller Charge • Fully Characterized Capacitance and Avalanche • Pb-free lead plating; RoHS compliant	• 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
DG80N02D	Halogen-Free	TO-252	D	Tape & Reel	2,500

Absolute Maximum Ratings (T_J=25°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	T_C=25°C	I_D	60	A
	T_C=100°C		60	A
Drain Current-Pulsed Note 1	T_C=25°C	I_{DM}	200	A
Avalanche Current		I_{AR}	30	A
Single Pulse Avalanche Energy		E_{AS}	45	mJ
Maximum Power Dissipation	T_C=25°C	P_{tot}	125	W
Operating and Storage Temperature Range		T_J, T_{STG}	-55 to +175	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Junction-to-Ambient Note 2	$R_{\theta JA}$	Steady State	-	-	50	°C/W
Thermal resistance, Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	1.2	°C/W

Notes:

1. Pulse Test: Pulse Width ≤ 380μs, Duty Cycle ≤ 2%.
2. $R_{\theta JA}$ 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 $R_{\theta JA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.
3. Limited by T_{Jmax}, starting T_J=25°C, L=0.1mH, R_g=50Ω, I_D=30A, V_{GS}=10V.

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}=10mA	80	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=64V, V_{GS}=0V, T_J=25°C	-	-	10	µA
		V_{DS}=64V, 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	1.6	2.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_{DS}=13A	-	-	6.9	mΩ
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_{DS}=9A	-	-	8.8	mΩ
Gate Resistance	R_g	V_{GS}=0V, V_{DS}=0V, f=1MHz	-	0.6	1.1	Ω
Forward Transconductance	g_{fs}	V_{DS}=5V, I_{DS}=30A	-	75	-	S

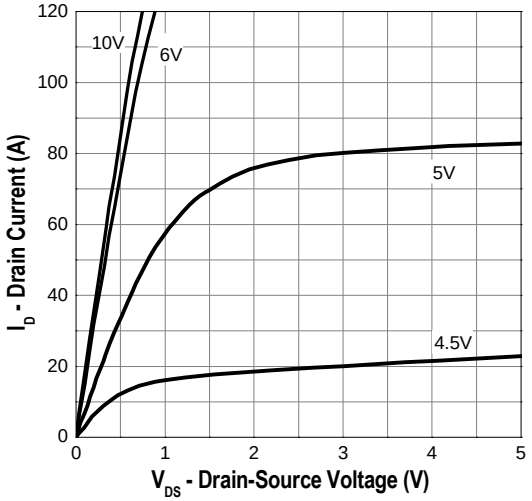
DYNAMIC CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Input Capacitance	C_{iss}	V_{DS}=40V, V_{GS}=0V, f=1MHz	-	2108	-	pF
Output Capacitance	C_{oss}	V_{DS}=40V, V_{GS}=0V, f=1MHz	-	363	-	pF
Reverse Transfer Capacitance	C_{rss}	V_{DS}=40V, V_{GS}=0V, f=1MHz	-	35	-	pF
Turn-On Delay Time	$T_{d(on)}$	V_{DS}=40V, V_{GS}=10V, I_{DS}=30A, R_{GEN}=3.6Ω	-	8.8	-	ns
Rise Time	t_r	V_{DS}=40V, V_{GS}=10V, I_{DS}=30A, R_{GEN}=3.6Ω	-	22.2	-	ns
Turn-Off Delay Time	$T_{d(off)}$	V_{DS}=40V, V_{GS}=10V, I_{DS}=30A, R_{GEN}=3.6Ω	-	35	-	ns
Fall Time	t_f	V_{DS}=40V, V_{GS}=10V, I_{DS}=30A, R_{GEN}=3.6Ω	-	57.4	-	ns

GATE CHARGE CHARACTERISTICS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Gate to Source Gate Charge	Q_{gs}	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	9.2	-	nC
Gate charge at threshold	$Q_{g(th)}$	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	6.85	-	nC
Gate to Drain Charge	Q_{gd}	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	7.7	-	nC
Switching charge	Q_{SW}	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	10.05	-	nC
Gate charge total	Q_g	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	41.75	-	nC
Gate charge total	Q_g	V_{DD}=40V, I_D=30A, V_{GS}=0 to 4.5V	-	20.35	-	nC
Gate plateau voltage	$V_{plateau}$	V_{DD}=40V, I_D=30A, V_{GS}=0 to 10V	-	3.65	-	V
Gate charge total, sync. FET (Q_g- Q_{gd})	$Q_{g(sync)}$	V_{DS}=0.1V, V_{GS}=0 to 10V	-	34.05	-	nC

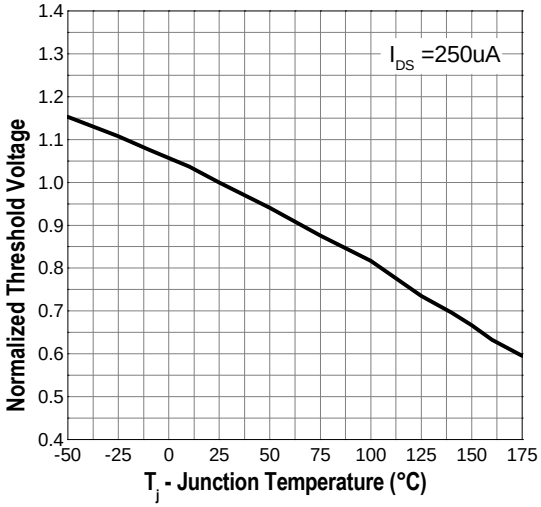
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	**Symbol**	**Conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Diode continuous forward current (Body Diode)	I_S	T_C=25°C	-	-	60	A
Diode pulse current (Body Diode)	I_{SM}	T_C=25°C	-	-	200	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=30A	-	-	1.2	V
Body Diode Reverse Recovery Time	t_{rr}	V_{DD}=40V, I_F=30A, di/dt=100A/µs	-	32	-	ns
		V_{DD}=40V, I_F=30A, di/dt=200A/µs	-	25	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}	V_{DD}=40V, I_F=30A, di/dt=100A/µs	-	29	-	nC
		V_{DD}=40V, I_F=30A, di/dt=200A/µs	-	45	-	nC

Typical Operating Characteristics

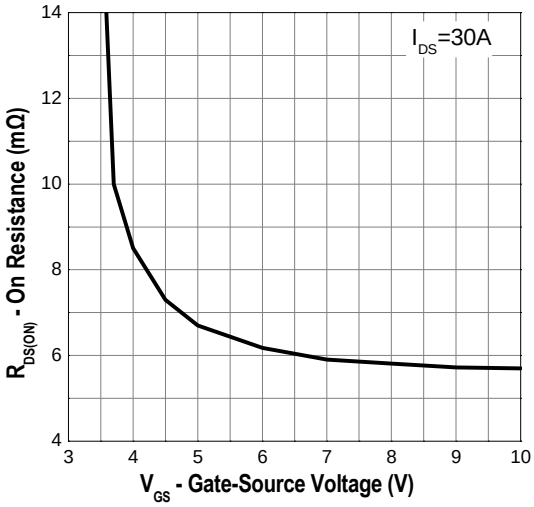
Output Characteristics



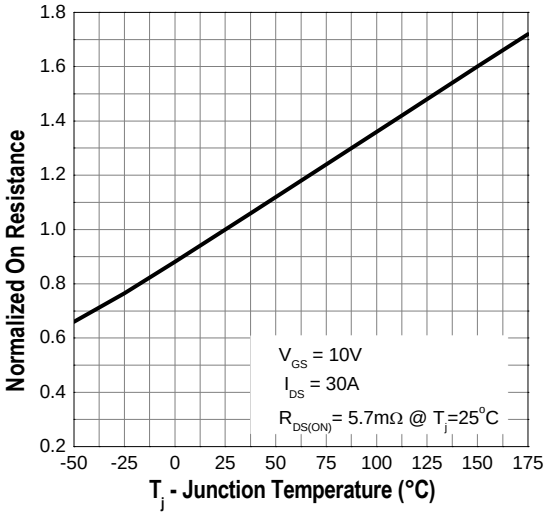
Gate Threshold Voltage



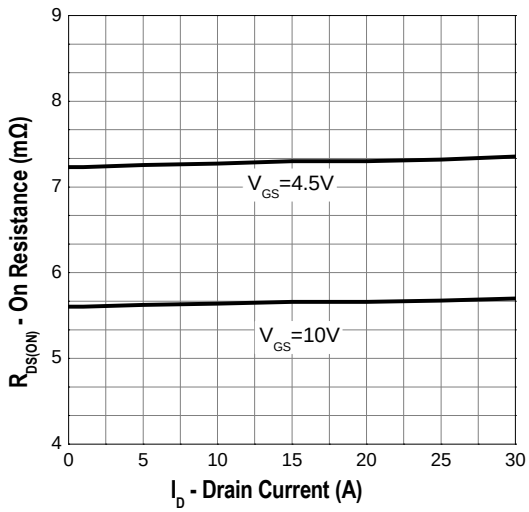
Gate-Source On Resistance



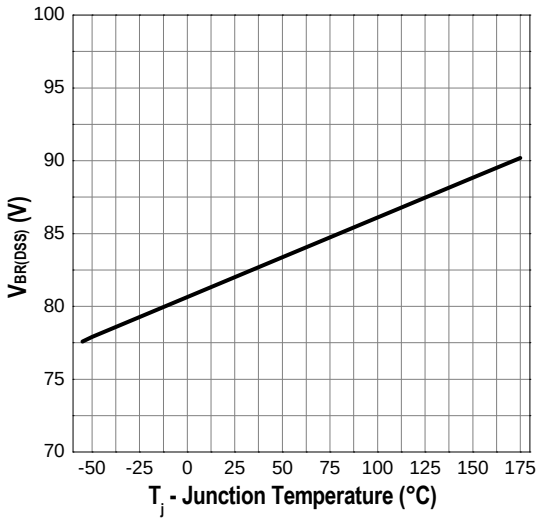
Drain-Source On Resistance



Drain-Source On Resistance

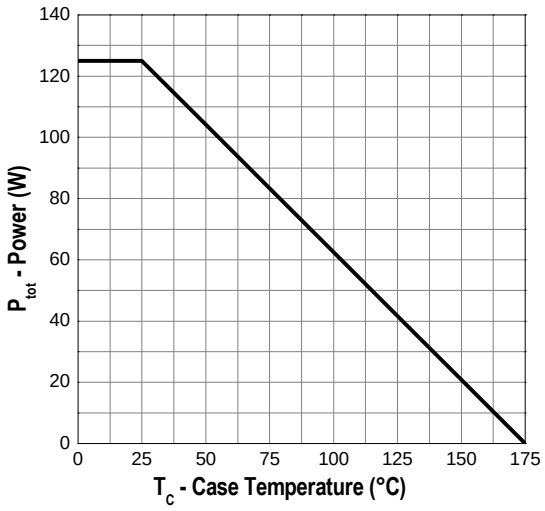


Drain-source Breakdown Voltage

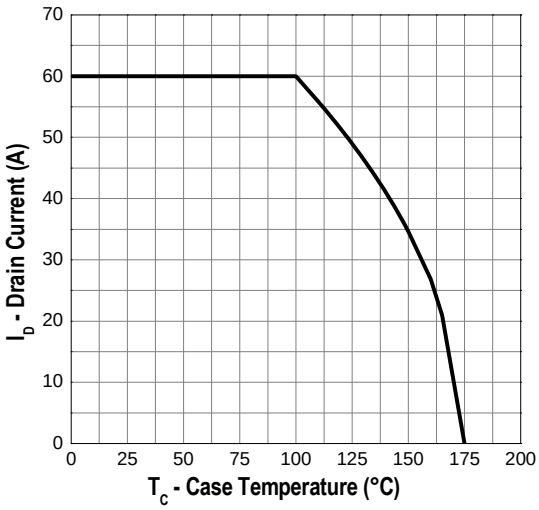


Typical Operating Characteristics (Cont.)

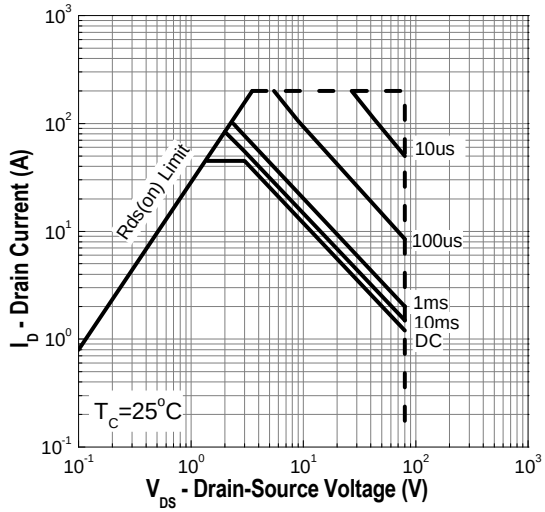
Power Dissipation



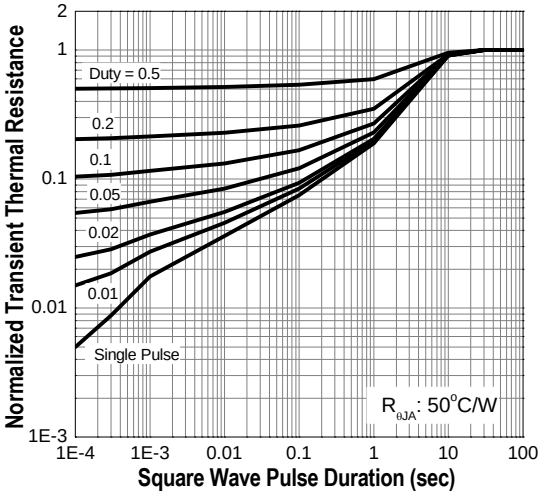
Drain Current



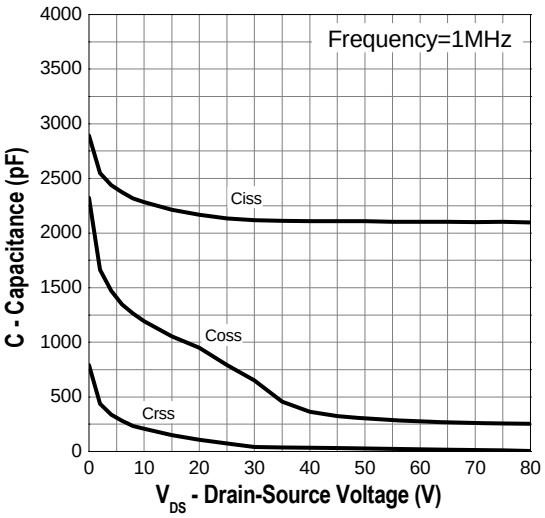
Safe Operation Area



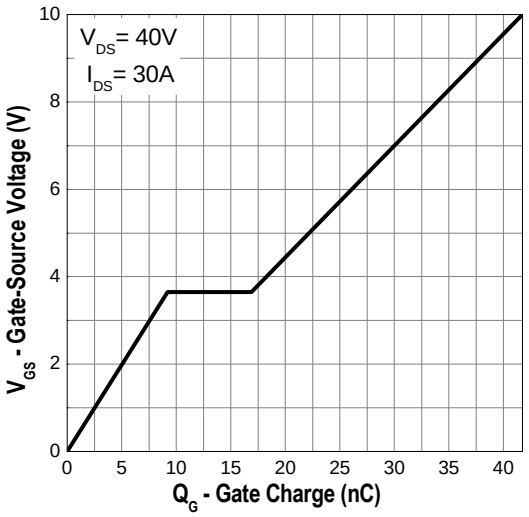
Transient Thermal Impedance



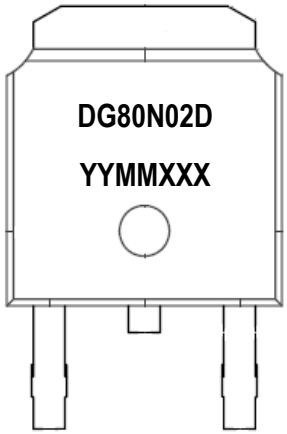
Capacitance



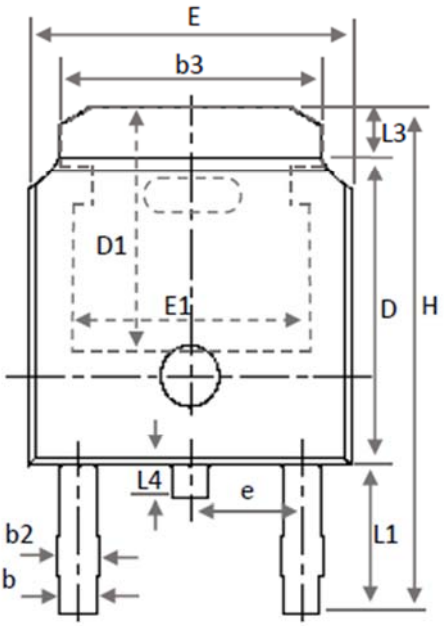
Gate Charge

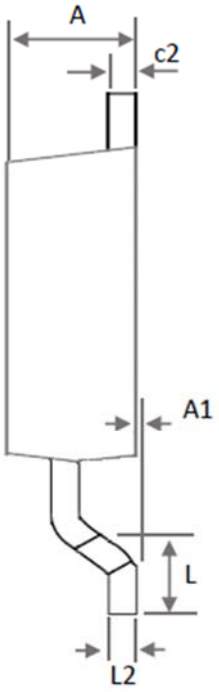


Marking Information

TO-252 (D)	Marking Rule
Laser Marking  	Line 1：Device DG80N02D Line 2：Date Code YYMMXXX YY：Year Code MM：Month Code XXX：Serial Number

Package of Dimension



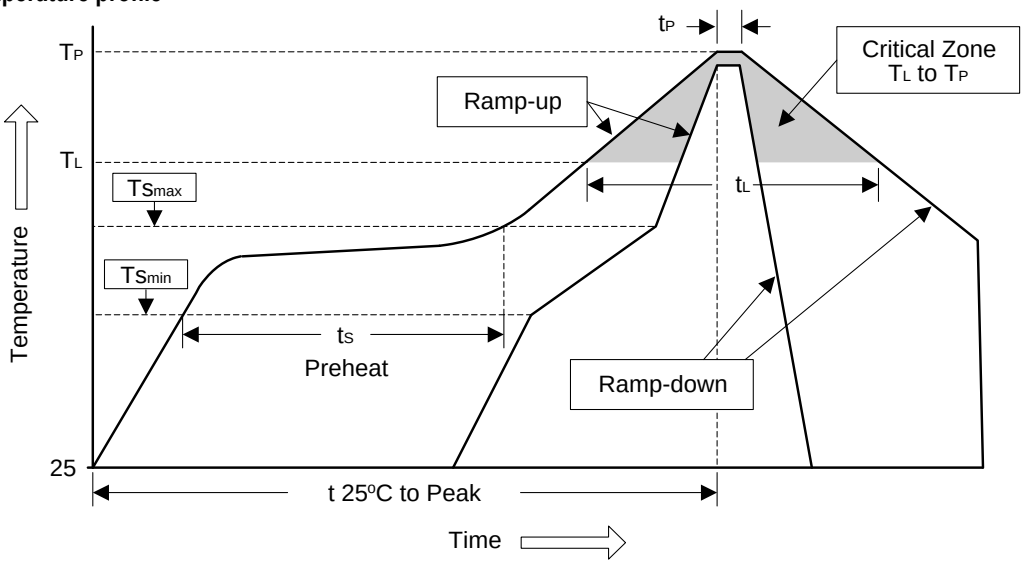


Symbol	Min	Nor	Max
E	6.35	6.54	6.731
L	1.40	1.59	1.78
L1		2.743 Ref.	
L2		0.508 BSC	
L3	0.89	1.08	1.27
L4	0.60	0.81	1.01
D	5.97	6.10	6.223
H	9.40	9.91	10.41
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	4.95	5.21	5.46
e		2.286 BSC	
A	2.18	2.29	2.39
A1	0.00	0.07	0.13
c2	0.46	0.68	0.89
D1	5.21	-	-
E1	4.32	-	-

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 (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 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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