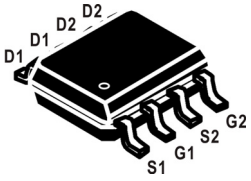
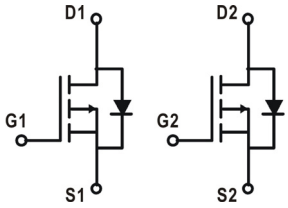
V_{DSS} , -30V
$R_{DS(ON)}$, 60mΩ (max.) @ V_{GS}=-10V
$R_{DS(ON)}$, 90mΩ (max.) @ V_{GS}=-4.5V
I_D , -5A

SOP-8





Description

The SG4953S is the highest performance trench P-Ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The SG4953S meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

Features

- Low On-Resistance
- Low Input Capacitance
- Low Miller Charge
- Low Input/Output Leakage

Applications

- Motor / Body Load Control
- Automotive Systems
- Load Switch
- DC-DC converters and Off-line UPS

Ordering Information

Ordering Code	RoHS Status	Package	Package Code	Packing	Quantity
SG4953S	Halogen-Free	SOP-8	S	Tape & Reel	2,500

Absolute Maximum Ratings (T_A=25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Drain Current-Continuous	T_C=25°C	I_D	-5	A
	T_C=70°C		-3.9	A
Drain Current-Pulsed Note 1		I_{DM}	-20	A
Drain Current-Continuous	T_A=25°C	I_D	-4.2	A
	T_A=70°C		-3.3	A
Avalanche Current, L=0.1mH		I_{AS}	-15	A
Avalanche Energy, L=0.1mH		E_{AS}	11.25	mJ
Maximum Power Dissipation	T_C=25°C	P_D	2.1	W
	T_C=70°C		1.3	W
	T_A=25°C		1.5	W
	T_A=70°C		0.9	W
Storage Temperature Range		T_{STG}	-55 to +150	°C
Operating Junction Temperature Range		T_J	-55 to +150	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient Note 2	$R_{\theta JA}$	Steady State	-	-	85	°C/W
Maximum Junction-to-Case Note 2	$R_{\theta JC}$	Steady State	-	-	60	°C/W

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

OFF CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_{DS}=-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA

ON CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS}, I_{DS}=-250μA	-1	-	-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_{DS}=-5A	-	45	60	mΩ
		V_{GS}=-4.5V, I_{DS}=-4A	-	66	90	

DYNAMIC CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C_{iss}	V_{DS}=-15V, V_{GS}=0V, f=1MHz	-	680	-	pF
Output Capacitance	C_{oss}		-	290	-	
Reverse Transfer Capacitance	C_{rss}		-	120	-	

SWITCHING CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	$T_{d(on)}$	V_{DD}=-15V, V_{GS}=-10V, R_G=3.3Ω, I_D=-5A	-	10	-	ns
Rise Time	t_r		-	17	-	
Turn-Off Delay Time	$T_{d(off)}$		-	22	-	
Fall Time	t_f		-	21	-	
Total Gate Charge at -4.5V	Q_g	V_{DS}=-15V, V_{GS}=-4.5V, I_D=-5A	-	6.5	-	nC
Gate to Source Gate Charge	Q_{gs}		-	2.8	-	
Gate to Drain “Miller” Charge	Q_{gd}		-	3	-	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

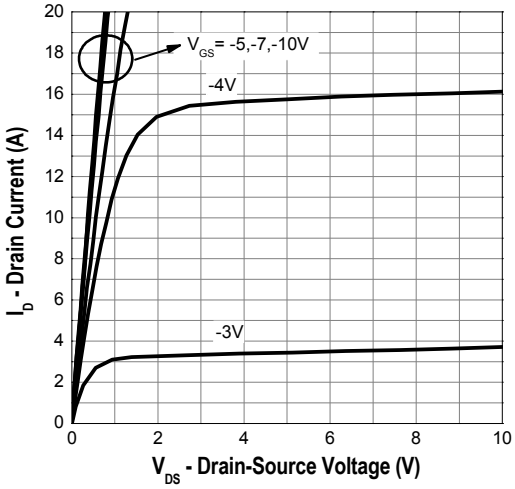
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-5A	-	-	-1.3	V
Body Diode Reverse Recovery Time	t_{rr}	I_F=-5A, dI/dt=100A/μs	-	12	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	3.5	-	nC

Notes:

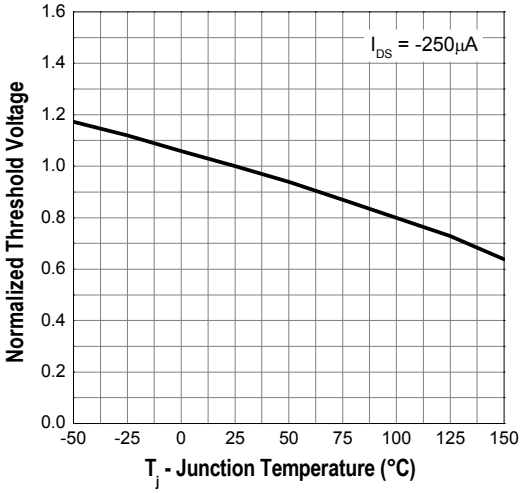
1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. $R_{\theta JA}$ shown below for single device operation on FR-4 in still air.

Typical Operating Characteristics

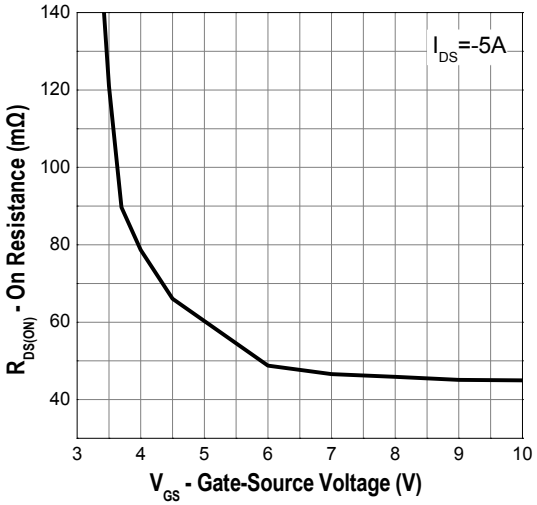
Output Characteristics



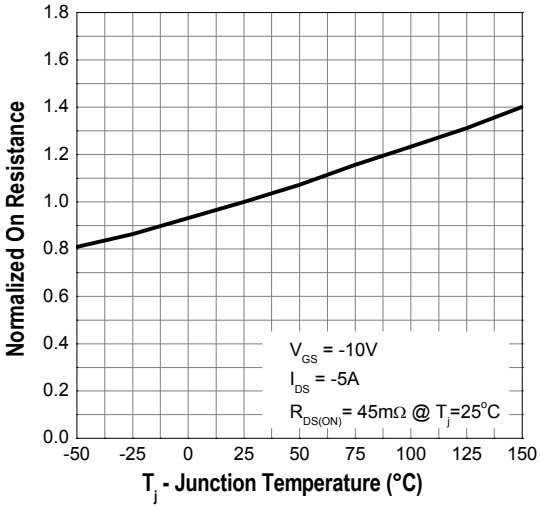
Gate Threshold Voltage



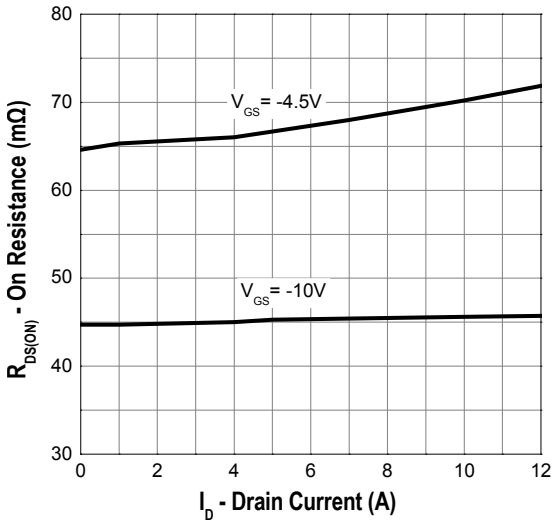
Gate-Source On Resistance



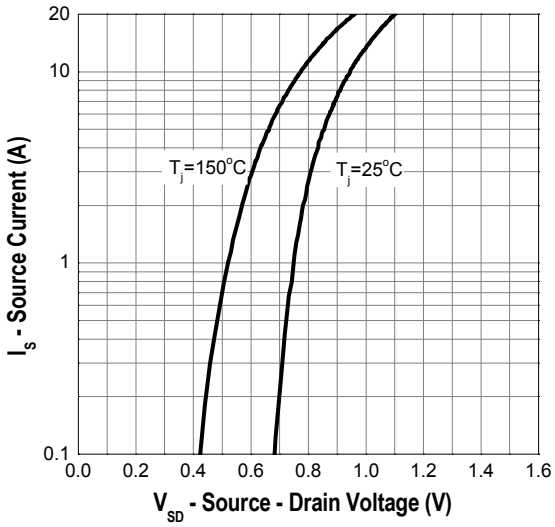
Drain-Source On Resistance



Drain-Source On Resistance

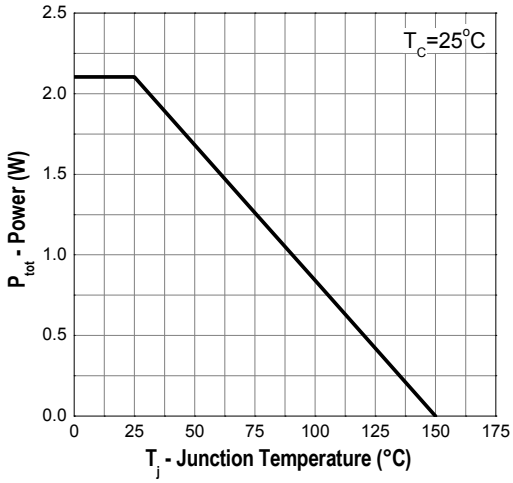


Source-Drain Diode Forward

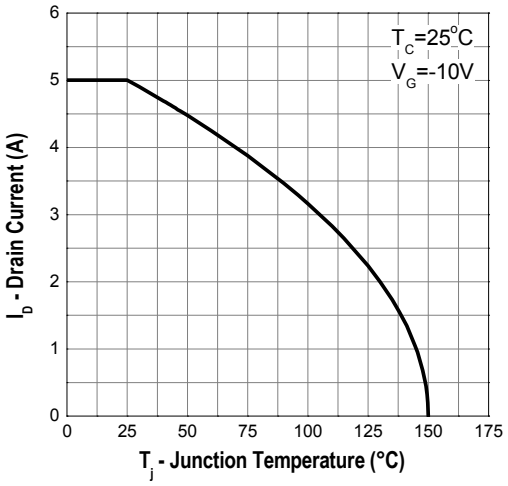


Typical Operating Characteristics (Cont.)

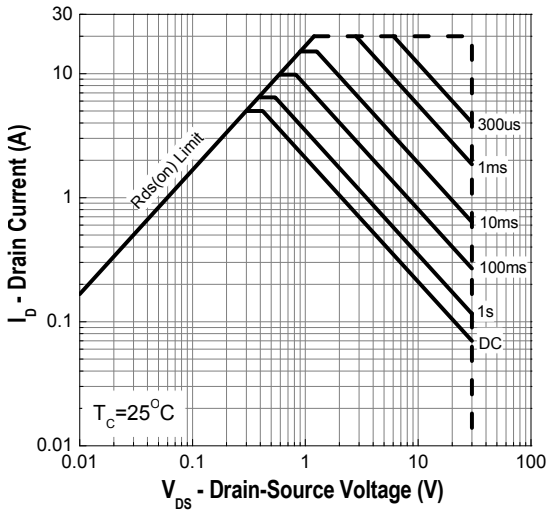
Power Dissipation



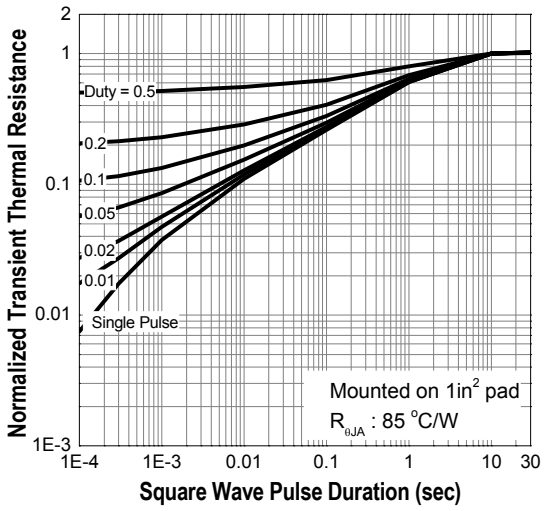
Drain Current



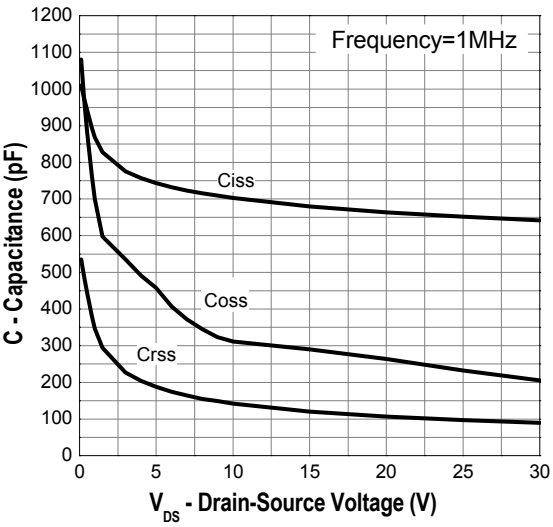
Safe Operation Area



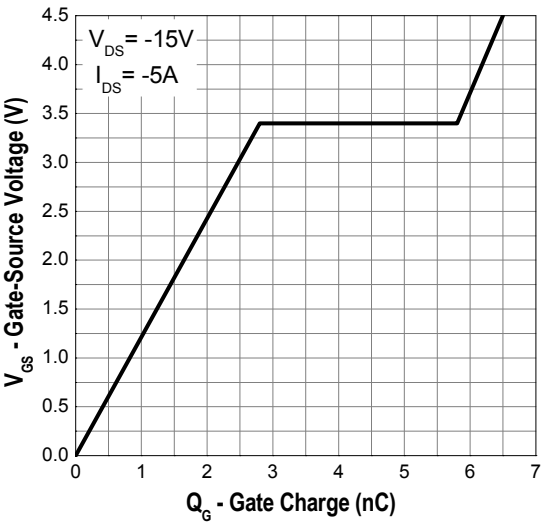
Transient Thermal Impedance



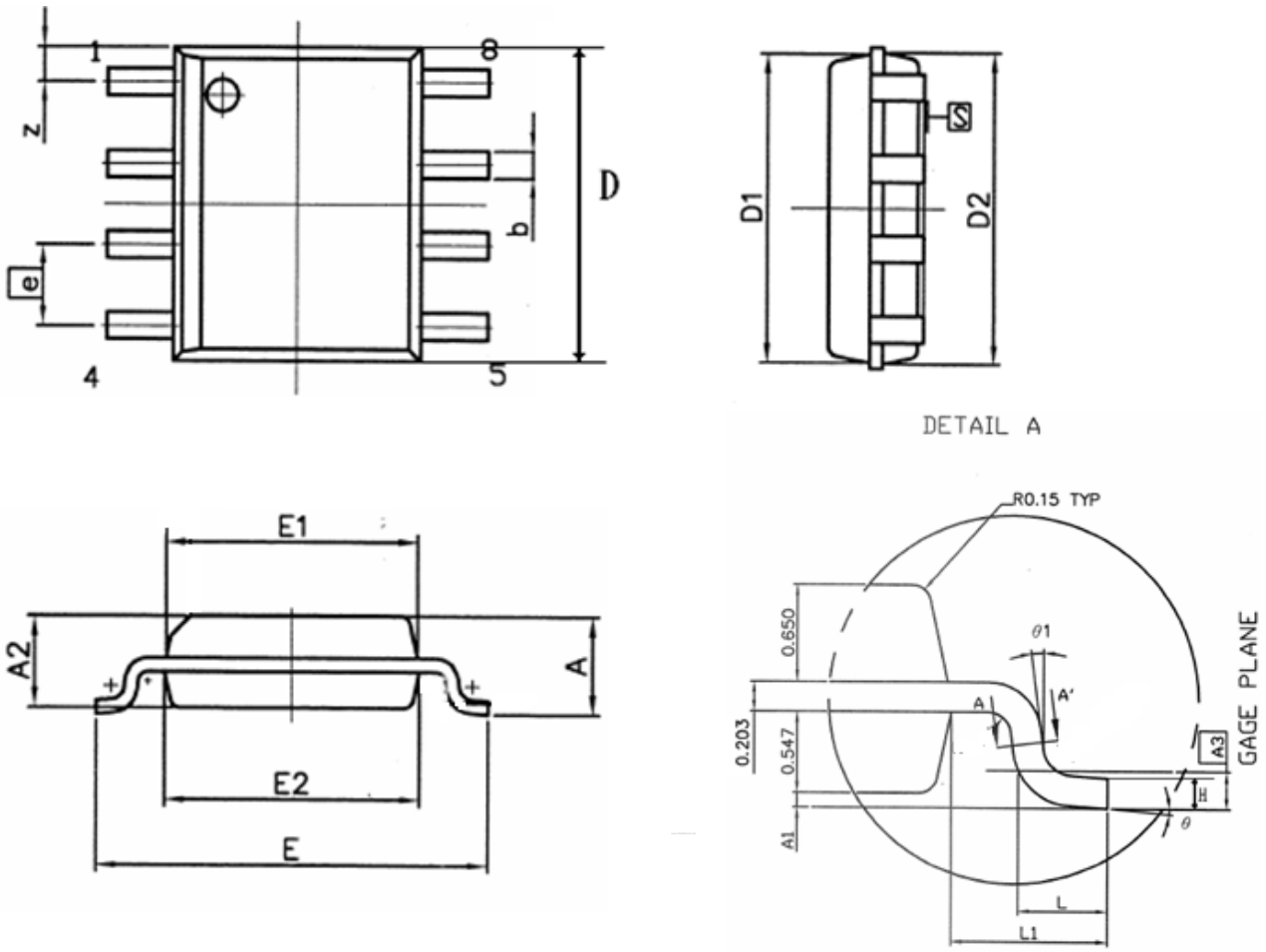
Capacitance



Gate Charge



SOP-8 Dimensions

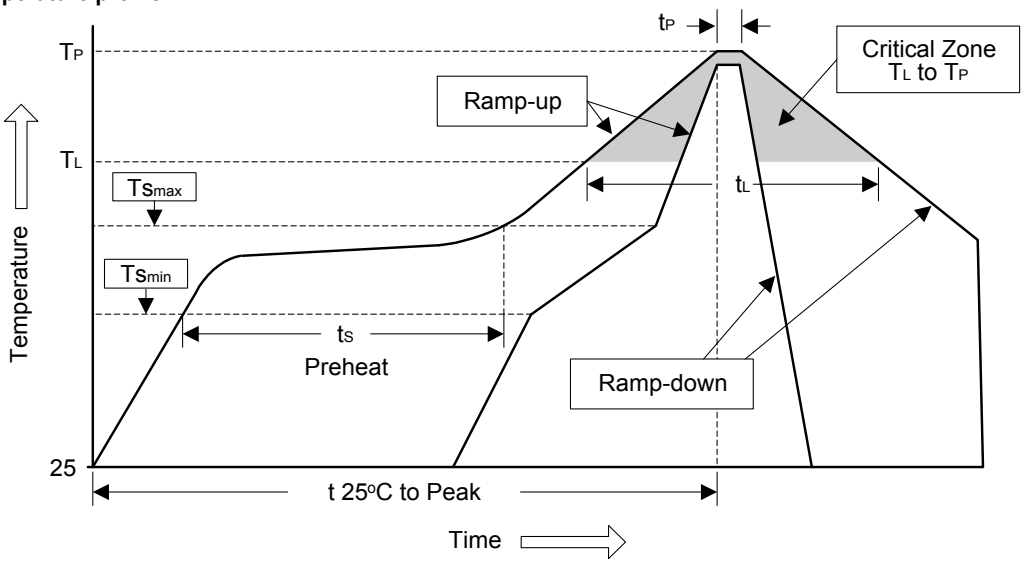


SOP-8 Dimensions						
Symbols	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	1.35	1.55	1.753	0.053	0.061	0.069
A1	0.10	0.15	0.25	0.004	0.006	0.010
A2	1.27	1.52	1.626	0.050	0.060	0.064
A3	-	0.254	-	-	0.010	-
b	0.30	0.40	0.51	0.012	0.016	0.020
D	4.70	4.90	5.10	0.185	0.193	0.201
D1	4.70	4.90	5.00	0.185	0.193	0.197
D2	4.80	4.90	5.00	0.189	0.193	0.197
E	5.79	6.00	6.20	0.228	0.236	0.244
E1	3.75	3.90	4.00	0.148	0.154	0.157
E2	3.75	3.90	4.00	0.148	0.154	0.157
H	0.17	0.21	0.25	0.007	0.008	0.010
e	-	1.27	-	-	0.050	-
L	0.40	0.76	1.27	0.016	0.030	0.050
L1	0.95	1.05	1.15	0.037	0.041	0.045
θ	0°	4°	8°	0°	4°	8°
θ1	0°	-	-	0°	-	-

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

Important Notice