

<b>V<sub>DSS</sub> , -30V</b> <b>R<sub>DS(ON)</sub> , 60mΩ (max.) @ V<sub>GS</sub>=-10V</b> <b>R<sub>DS(ON)</sub> , 90mΩ (max.) @ V<sub>GS</sub>=-4.5V</b> <b>I<sub>D</sub> , -5A</b>	<b>SOP-8</b>	

Description	Features
<p>The SG4953S is the highest performance trench P-Ch MOSFETs with extreme high cell density, which provide excellent R<sub>DS(ON)</sub> and gate charge for most of the synchronous buck converter applications.</p> <p>The SG4953S meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.</p>	<ul style="list-style-type: none"> <li>• Low On-Resistance</li> <li>• Low Input Capacitance</li> <li>• Low Miller Charge</li> <li>• Low Input/Output Leakage</li> </ul>
	Applications
	<ul style="list-style-type: none"> <li>• Motor / Body Load Control</li> <li>• Automotive Systems</li> <li>• Load Switch</li> <li>• DC-DC converters and Off-line UPS</li> </ul>

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 <sub>A</sub> =25°C unless otherwise noted)				
Parameter		Symbol	Value	Unit
Drain-Source Voltage		V <sub>DS</sub>	-30	V
Gate-Source Voltage		V <sub>GS</sub>	±20	V
Drain Current-Continuous	T <sub>C</sub> =25°C	I <sub>D</sub>	-5	A
	T <sub>C</sub> =70°C		-3.9	A
Drain Current-Pulsed <sup>Note 1</sup>		I <sub>DM</sub>	-20	A
Drain Current-Continuous	T <sub>A</sub> =25°C	I <sub>D</sub>	-4.2	A
	T <sub>A</sub> =70°C		-3.3	A
Avalanche Current, L=0.1mH		I <sub>AS</sub>	-15	A
Avalanche Energy, L=0.1mH		E <sub>AS</sub>	11.25	mJ
Maximum Power Dissipation	T <sub>C</sub> =25°C	P <sub>D</sub>	2.1	W
	T <sub>C</sub> =70°C		1.3	W
	T <sub>A</sub> =25°C		1.5	W
	T <sub>A</sub> =70°C		0.9	W
Storage Temperature Range		T <sub>STG</sub>	-55 to +150	°C
Operating Junction Temperature Range		T <sub>J</sub>	-55 to +150	°C

Thermal Resistance Ratings						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient <sup>Note 2</sup>	R <sub>θJA</sub>	Steady State	-	-	85	°C/W
Maximum Junction-to-Case <sup>Note 2</sup>	R <sub>θJC</sub>	Steady State	-	-	60	°C/W

### Electrical Characteristics (T<sub>J</sub>=25°C unless otherwise noted)

#### OFF CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =-250μA	-30	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V	-	-	-1	μA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

#### ON 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	-	-3	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =-10V, I <sub>DS</sub> =-5A	-	45	60	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>DS</sub> =-4A	-	66	90	

#### DYNAMIC CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	-	680	-	pF
Output Capacitance	C <sub>oss</sub>		-	290	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	120	-	

#### SWITCHING CHARACTERISTICS

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>DD</sub> =-15V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-5A	-	10	-	ns
Rise Time	t <sub>r</sub>		-	17	-	
Turn-Off Delay Time	T <sub>d(off)</sub>		-	22	-	
Fall Time	t <sub>f</sub>		-	21	-	
Total Gate Charge at -4.5V	Q <sub>g</sub>	V <sub>DS</sub> =-15V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-5A	-	6.5	-	nC
Gate to Source Gate Charge	Q <sub>gs</sub>		-	2.8	-	
Gate to Drain "Miller" Charge	Q <sub>gd</sub>		-	3	-	

#### DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS

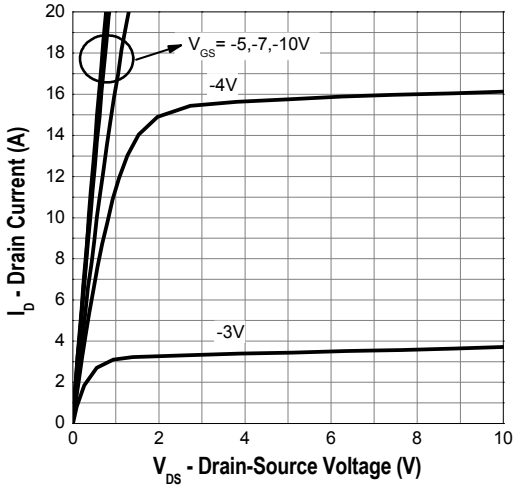
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =-5A	-	-	-1.3	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =-5A, di/dt=100A/μs	-	12	-	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>		-	3.5	-	nC

#### Notes:

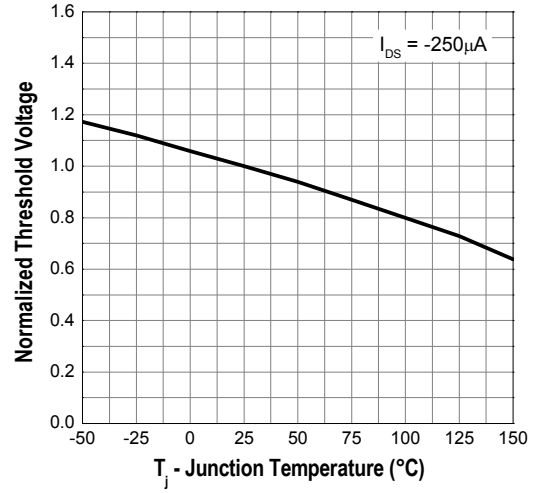
- Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- R<sub>θJA</sub> is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. R<sub>θJC</sub> is guaranteed by design while R<sub>θCA</sub> is determined by the user's board design. R<sub>θJA</sub> shown below for single device operation on FR-4 in still air.

## Typical Operating Characteristics

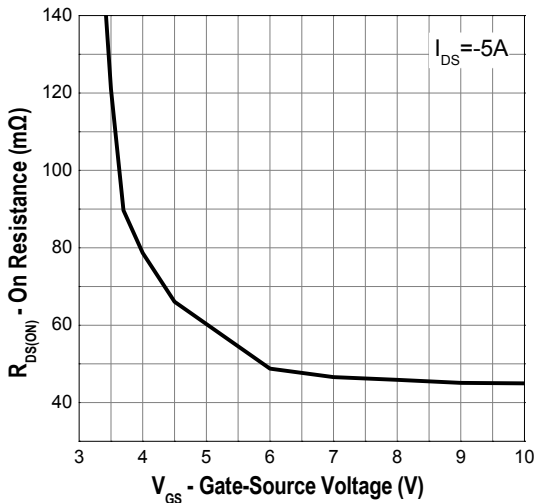
### Output Characteristics



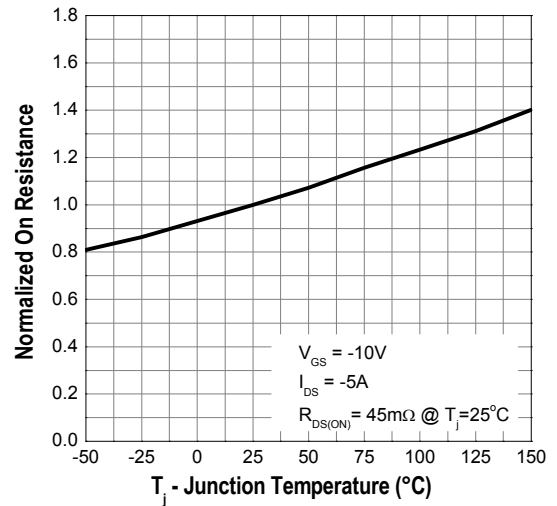
### Gate Threshold Voltage



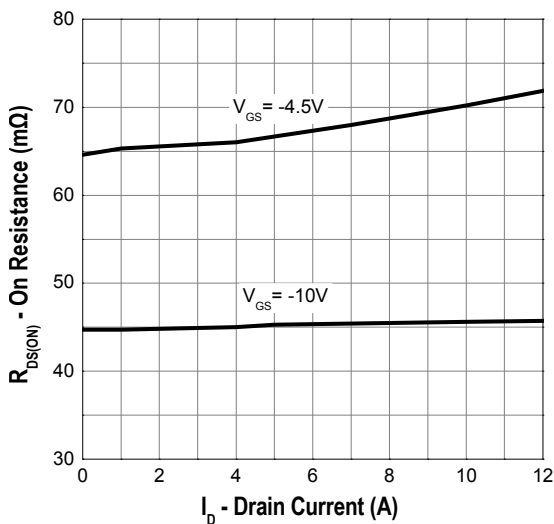
### Gate-Source On Resistance



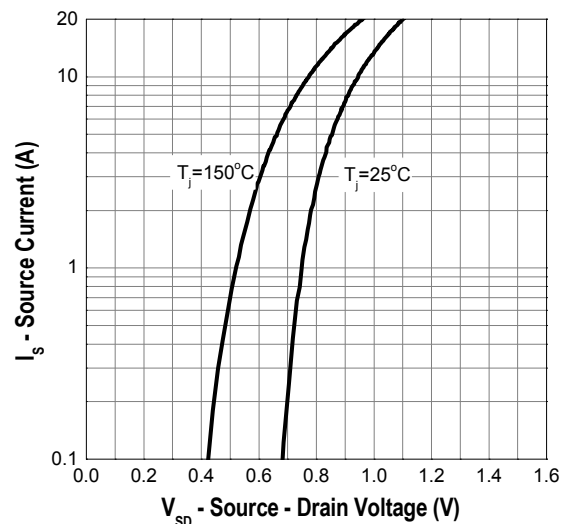
### Drain-Source On Resistance



### Drain-Source On Resistance

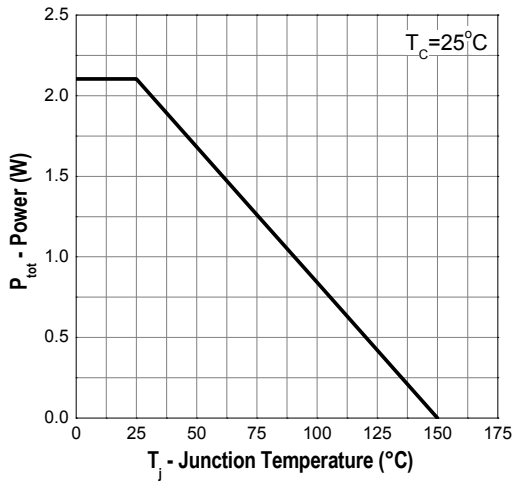


### Source-Drain Diode Forward

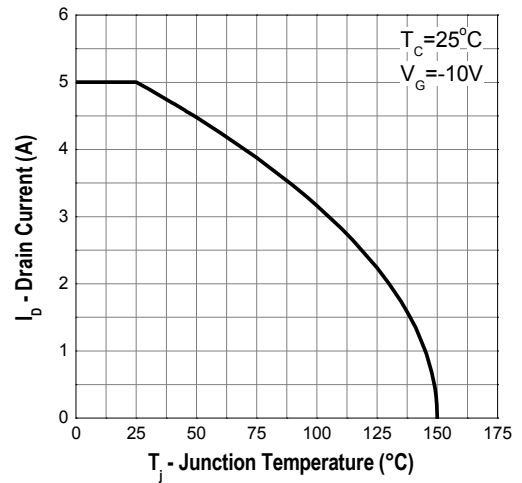


## Typical Operating Characteristics (Cont.)

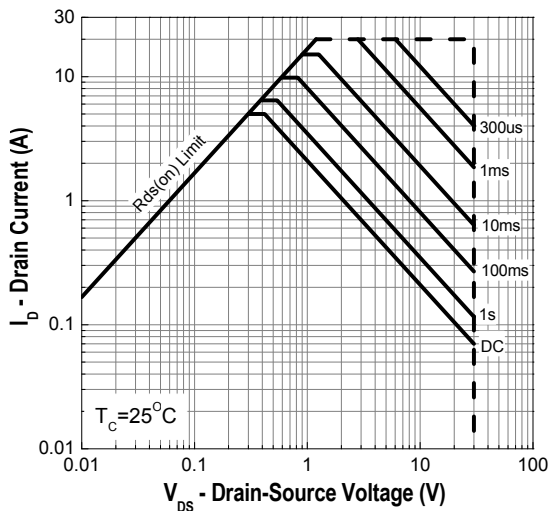
### Power Dissipation



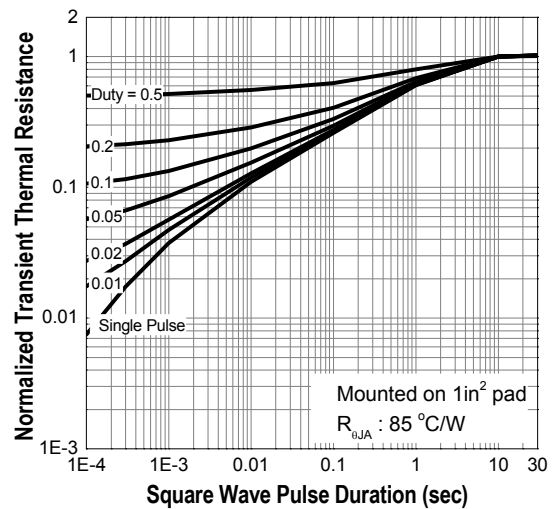
### Drain Current



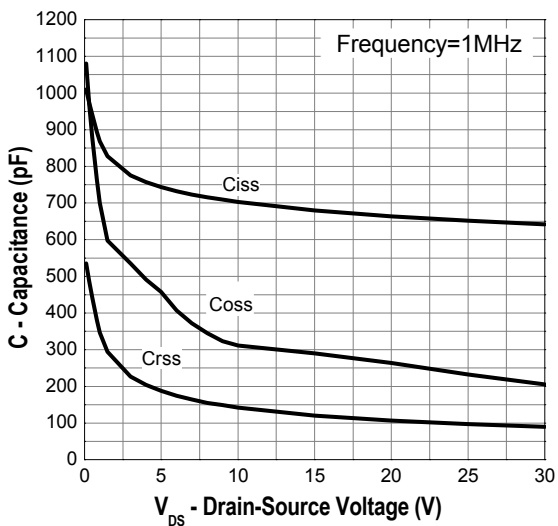
### Safe Operation Area



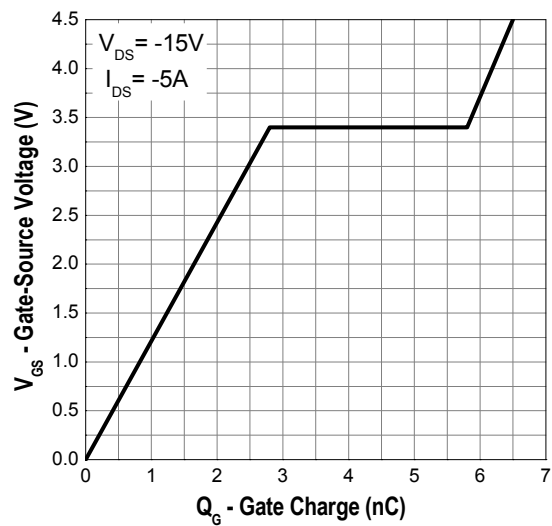
### Transient Thermal Impedance



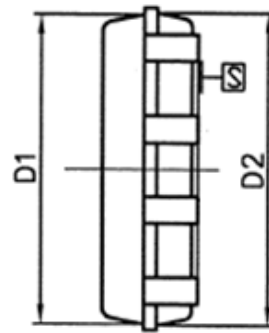
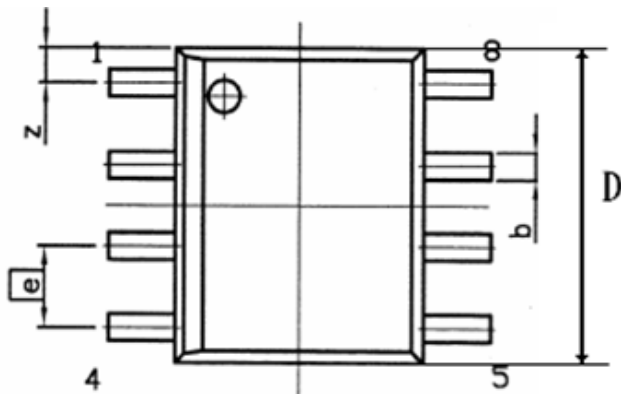
### Capacitance



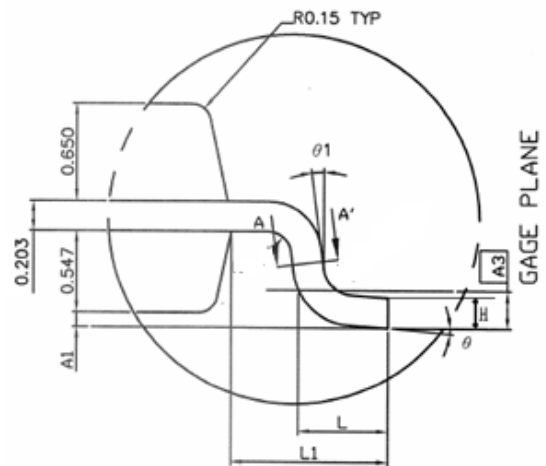
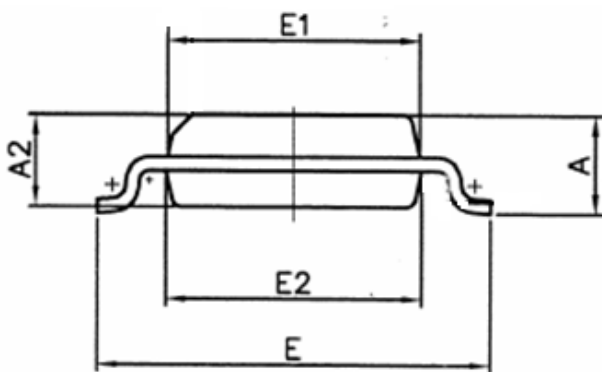
### Gate Charge



## SOP-8 Dimensions



DETAIL A

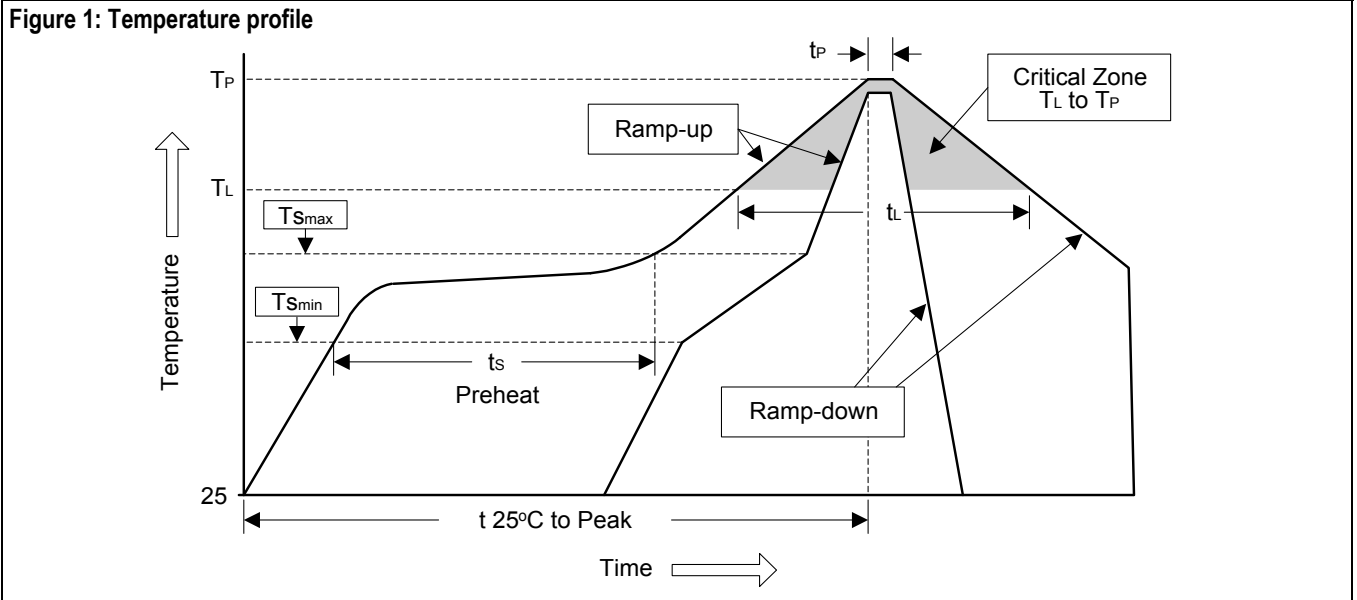


SOP-8 Dimensions

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



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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