P7N65S

Silicon 650V N-Channel MOSFET

VOLTAGE	650 Volts	CURRENT	7.0 Ampers	TO-252

FEATURES

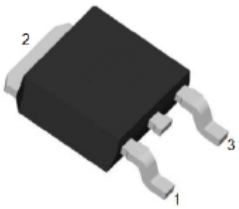
- Low RDS(ON)
- Ultra Low Gate Charge
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

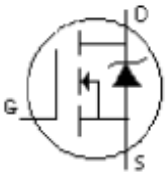
APPLICATIONS

- Power factor correction（PFC）
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply（UPS）

Product Summary

VDS	650	V
ID	7	A
RDS(on)@10V	1.2	Ω
Qg	28	nC





Gate:1,Drain:2,Source:3

Absolute maximum ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	650	V
Gate-Source voltage	V_{GS}	±30	V
Continuous drain current	I_D	7	A
Drain Current-Pulsed	I_{DM}	28	A
Power dissipation	P_D	80	W
Avalanche energy, single pulse (Note 2)	E_{AS}	230	mJ
Operating junction	T_j	150	°C
storage temperature	T_{stg}	-55~150	°C

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	1.56	℃/W
Thermal resistance, junction – ambient ((Note 3))	R_{thJA}	60	

Note: 1.Ensure that the channel temperature does not exceed 150℃.

2.VDD=50V, Tch= 25℃(initial), L=0.5mH, Rg=25Ω.

3.The value of R θ JA is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with TA =25° C. The value in any given application depends on the user's specific board design.

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Electrical characteristics (TA = 25 ℃, unless otherwise noted)

Parameter	Symbol	TEST CONDITION	Value			Unit
			Min.	Typ.	Max.	
■Static Characteristic						
Drain-source breakdown voltage	BV_{DSS}	V_{GS}=0V, I_D=250uA	650	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=650V,V_{GS}=0V	-	-	1	μA
Gate-source leakage current	I_{GSS}	V_{GS}=±30V,V_{DS}=0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250uA	2	3	4	V
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10V, I_D=3.5A	-	1.2	1.5	mΩ
■Dynamic Characteristic						
Input Capacitance	C_{iss}	VDS=25V,VGS=0V, f=1.0MHz	-	955	-	pF
Output Capacitance	C_{oss}		-	135	-	
Reverse Transfer Capacitance	C_{rss}		-	16	-	
Gate Resistance	Rg	VDS=0V,VGS=0V,f=1MHz	-	1.8	-	Ω
■Switching Paramters						
Turn-On Delay Time	td(on)	VDS=325V,ID=7A, VGS=10V,RG=25Ω	-	30	-	nS
Turn-On Rise Time	tr		-	80	-	nS
Turn-Off Delay Time	td(off)		-	90	-	nS
Turn-Off Rise Time	tf		-	60	-	nS
Gate Total Charge	Q_g	VDS=520V,ID=7A, VGS=10V	-	28	-	nC
Gate-Source charge	Q_{gs}		-	7	-	
Gate-Drain charge	Q_{gd}		-	12	-	
■Source-Drain Characteristics						
Max. Diode Forward Cuurent	I_S		-	-	7	A
Max. Pulsed Forward Cuurent	I_{SM}		-	-	28	A
Body Diode Forward Voltage	V_{SD}	V_{GS}=0V,I_S=7A	-	0.92	1.5	v
Reverse Recovery Time	T_{rr}	VR=20V,IF=20A, di/dt=100A/us	-	400	-	nS
Reverse Recovery Charge	Qrr	VR=400V,IF=7A, di/dt=100A/us	-	3.3	-	uC

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Typical Performance Characteristics

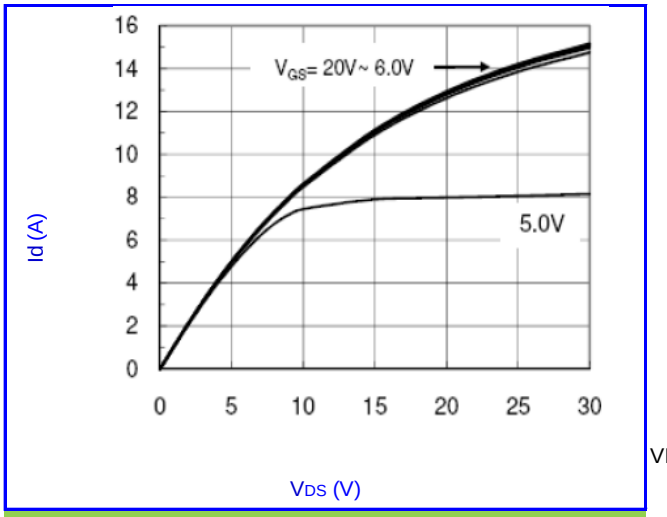


Fig 1: Output Characteristics

VDS

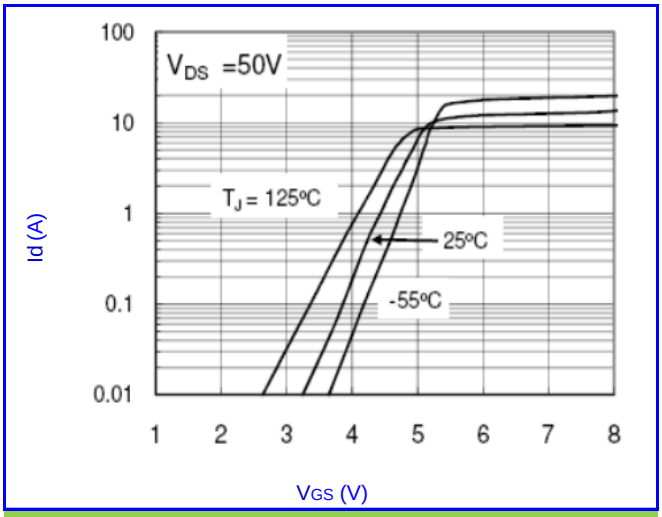


Fig 2: Transfer Characteristics

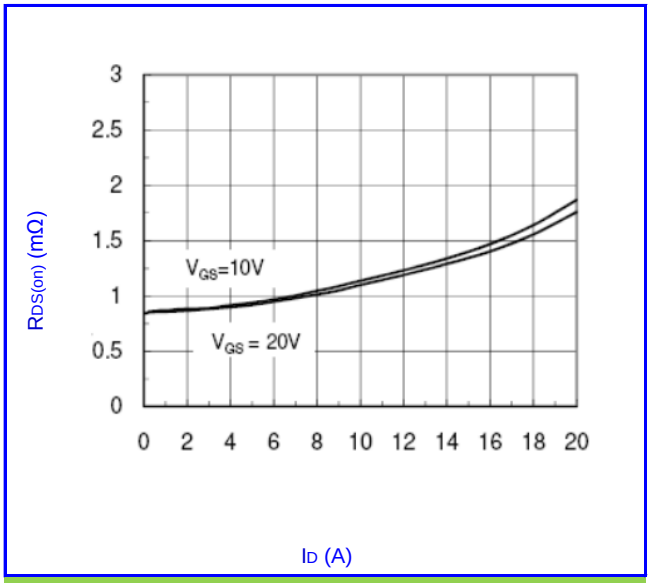


Fig 3: Rds(on) vs Drain Current and Gate Voltage

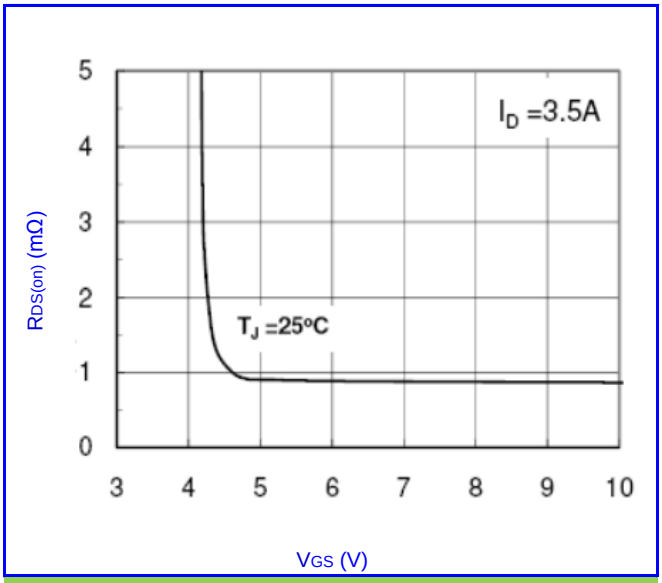


Fig 4: Rds(on) vs Gate Voltage

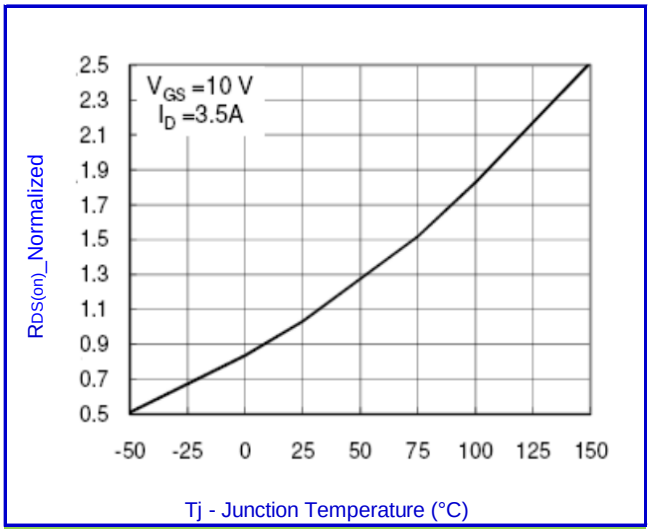


Fig 5: Rds(on) vs. Temperature

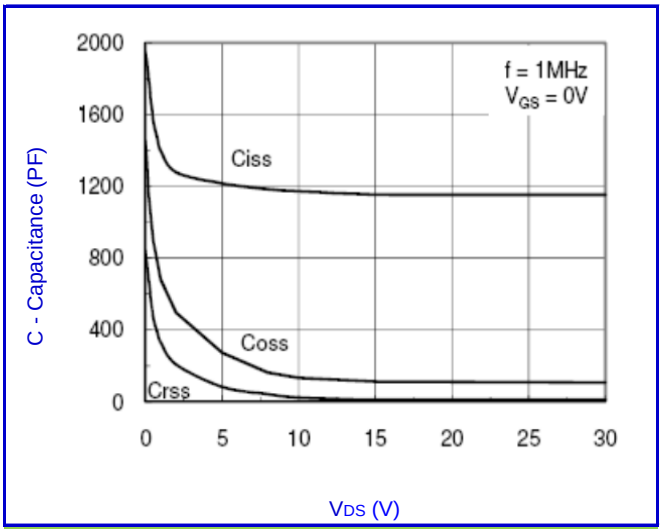


Fig 6: Capacitance Characteristics

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Typical Performance Characteristics

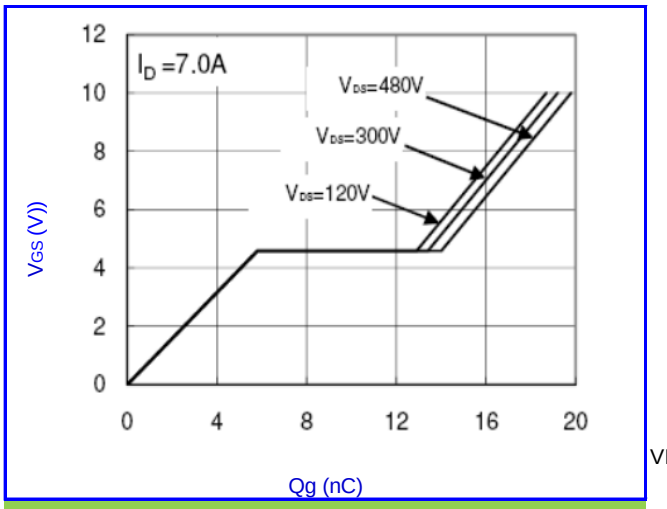


Fig 7: Gate Charge Characteristics

VDS

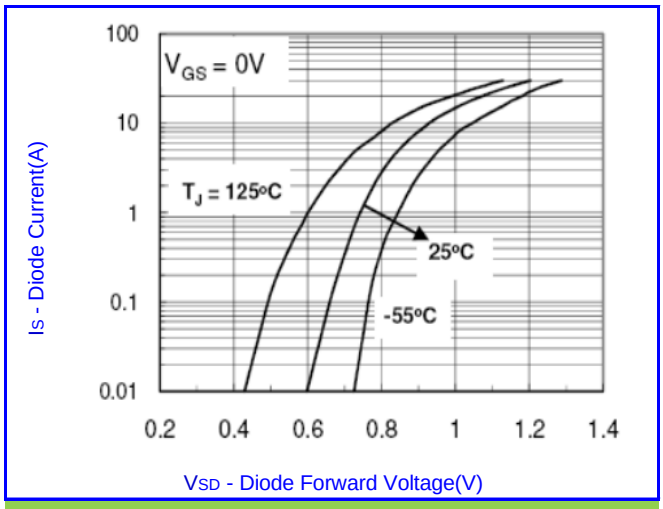


Fig 8: Body-diode Forward Characteristics

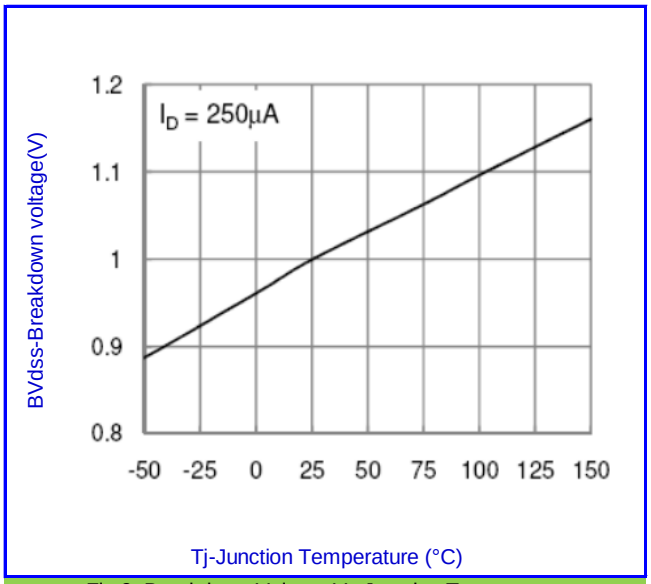


Fig 9: Breakdown Voltage Vs Junction Temperature

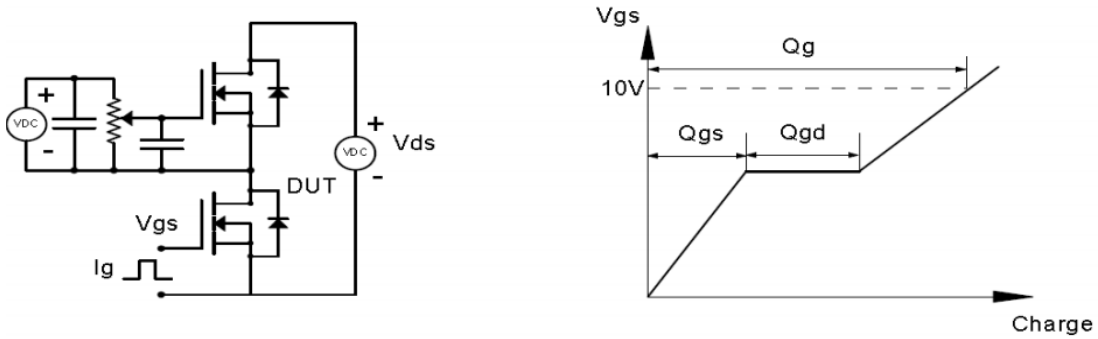
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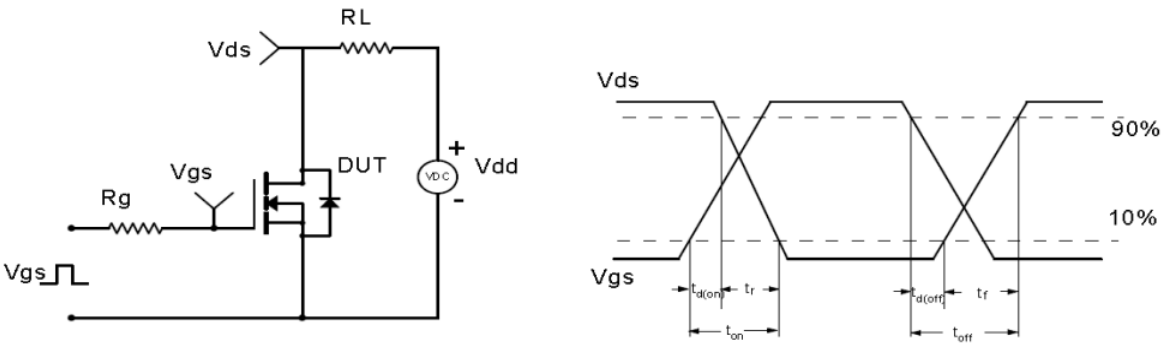
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Test Circuit & Waveform

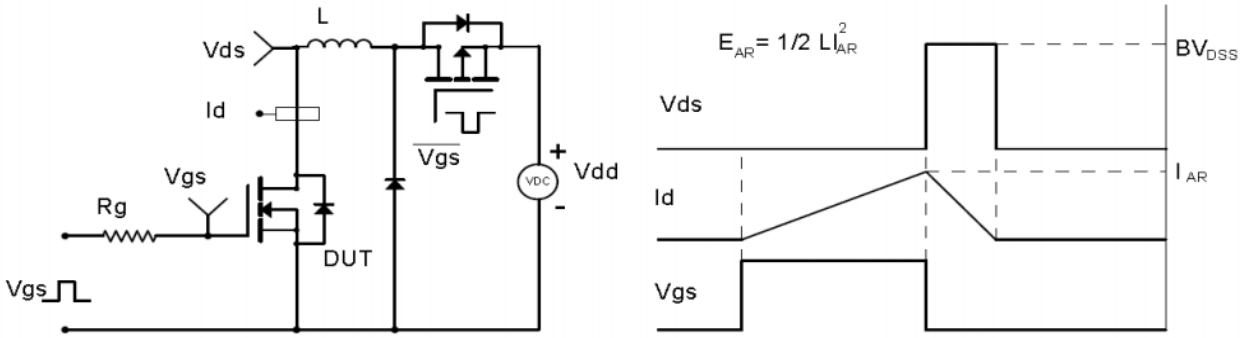
Gate Charge Test Circuit & Waveform



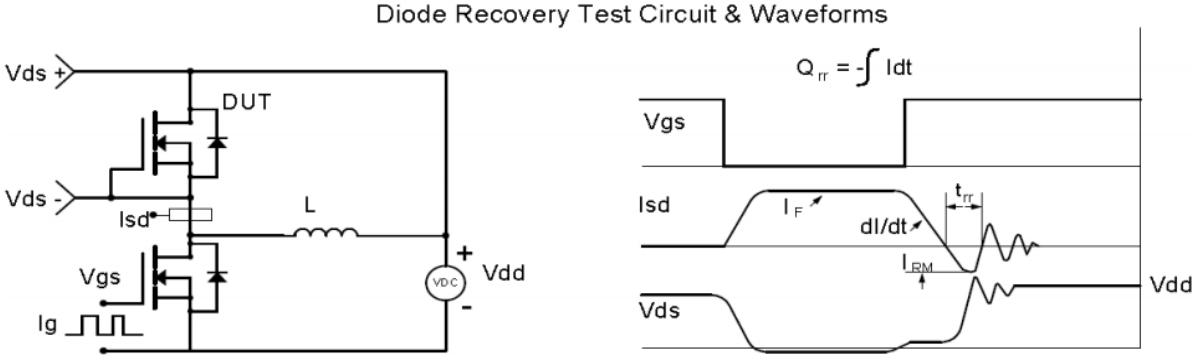
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

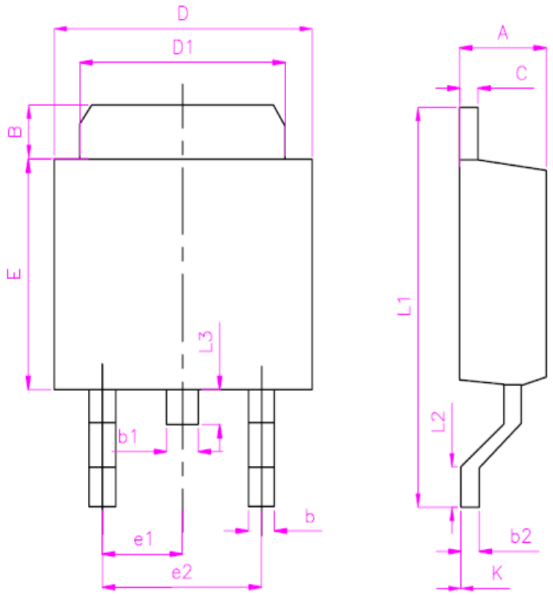


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OUTLINE DRAWINGS: TO-220-3L



OUTLINE DIMENSIONS			
DIM	MILLIMETERS		
	MIN.	TYP.	MAX.
A	2.10	-	2.50
B	0.80	-	1.25
b	0.50	-	0.85
b1	0.50	-	0.90
b2	0.45	-	0.60
C	0.45	-	0.60
D	6.35	-	6.75
D1	5.10	-	5.50
E	5.80	-	6.30
e1	2.25	2.30	2.35
e2	4.45	-	4.75
L1	9.50	-	10.20
L2	0.90	-	1.45
L3	0.60	-	1.10
K	-0.10	-	0.10

Packing Information

Product code	Pack	Box Size L×W×H(mm)	Quantity (pcs/box)	Carton Size L×W×H(mm)	Quantity (box/carton)
NVT075N03S TO-252	T/R	350×350×40	3000	360×360×210	5

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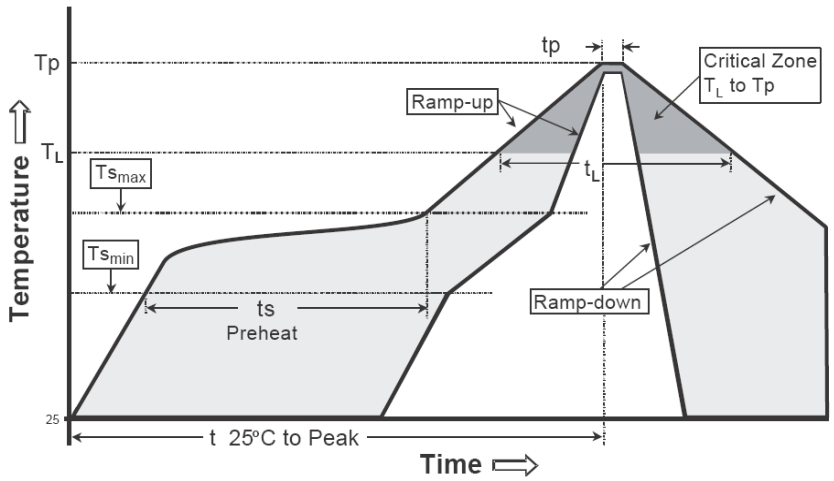
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OUTLINE DRAWINGS: TO-220-3L

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(TS min) −Temperature Max(TS max) −Time(ts min to ts max)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (TL) − Time (tL)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(TP)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

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