

NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE1550 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

General Features

- $V_{DS} = 150V, I_D = 50A$
 $R_{DS(ON)} < 23m\Omega @ V_{GS} = 10V$
- High density cell design for ultra low R_{dson}
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

- Power switching application
- Hard switched and High frequency circuits
- Uninterruptible power supply

100% UIS TESTED!

100% ΔV_{ds} TESTED!



Schematic diagram



Marking and pin assignment



TO-220-3L top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE1550	NCE1550	TO-220-3L	-	-	-

Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	150	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	50	A
Drain Current-Continuous($T_C = 100^\circ C$)	$I_D(100^\circ C)$	35	A
Pulsed Drain Current	I_{DM}	200	A
Maximum Power Dissipation	P_D	220	W
Derating factor		1.47	W/ $^\circ C$
Single pulse avalanche energy ^(Note 5)	E_{AS}	640	mJ

Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	°C
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Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note 2)	$R_{\theta JC}$	0.68	°C/W
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Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	150	170	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.5	3.2	4.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$	-	19.5	23	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=20A$	85	-	-	S
Dynamic Characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=75V, V_{GS}=0V,$ $F=1.0\text{MHz}$	5300	6313.1	7800	PF
Output Capacitance	C_{oss}		-	181.2	-	PF
Reverse Transfer Capacitance	C_{riss}		-	154.3	-	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=75V, R_L=3.75\Omega$ $V_{GS}=10V, R_G=2.5\Omega$	-	26	-	nS
Turn-on Rise Time	t_r		-	24	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	91	-	nS
Turn-Off Fall Time	t_f		-	39	-	nS
Total Gate Charge	Q_g	$V_{DS}=75V, I_D=20A,$ $V_{GS}=10V$	-	151	-	nC
Gate-Source Charge	Q_{gs}		-	30	-	nC
Gate-Drain Charge	Q_{gd}		-	49.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$V_{GS}=0V, I_S=20A$	-	-	1.2	V
Diode Forward Current ^(Note 2)	I_S		-	-	50	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = 40A$ $di/dt = 100A/\mu\text{s}$ ^(Note 3)	-	42	-	nS
Reverse Recovery Charge	Q_{rr}		-	66	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

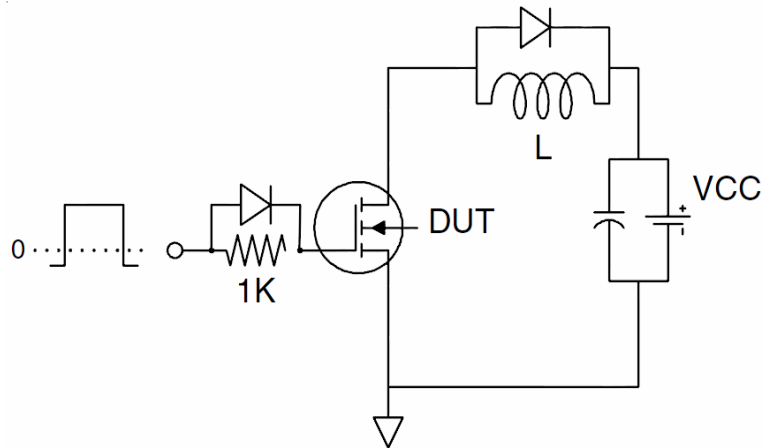
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition: $T_J=25^\circ\text{C}, V_{DD}=50V, V_G=10V, L=0.5\text{mH}, R_G=25\Omega$

Test Circuit

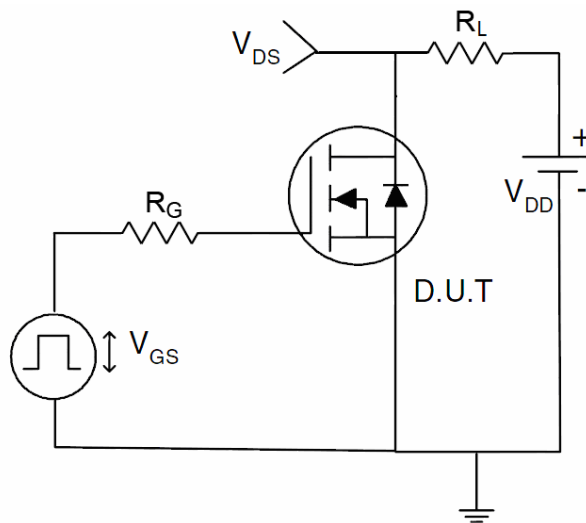
1) E_{AS} test Circuit



2) Gate charge test Circuit



3) Switch Time Test Circuit



Typical Electrical and Thermal Characteristics (Curves)

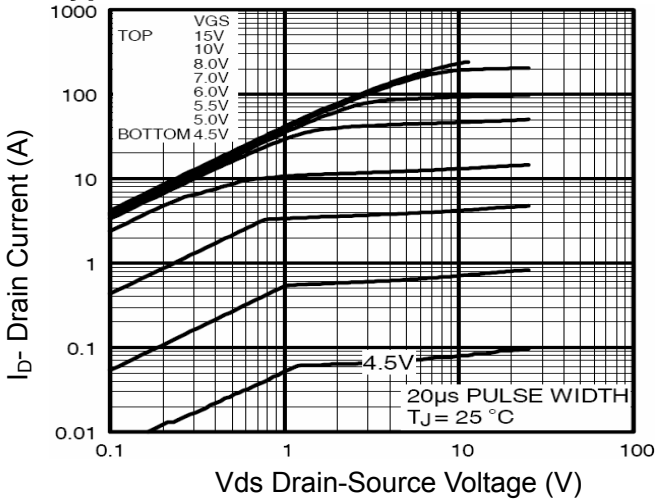


Figure 1 Output Characteristics

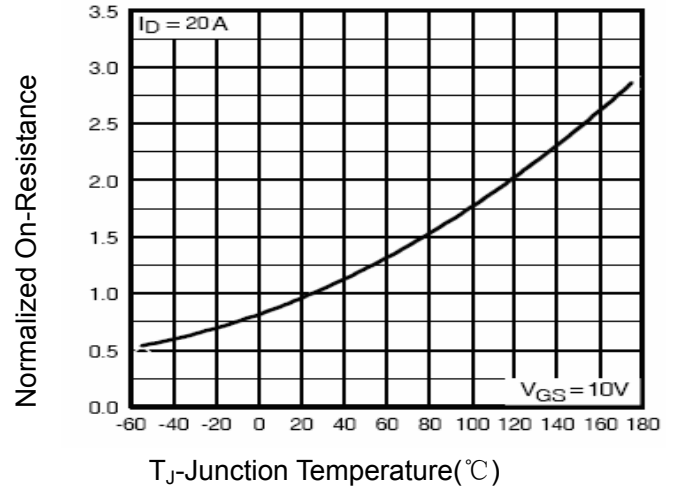


Figure 4 Rdson-Junction Temperature

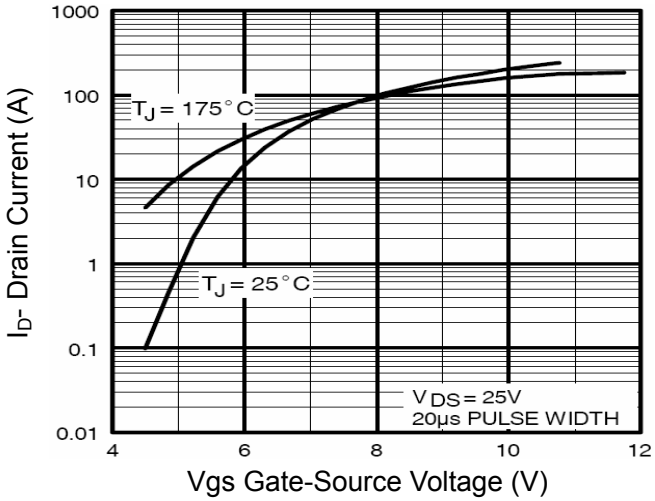


Figure 2 Transfer Characteristics

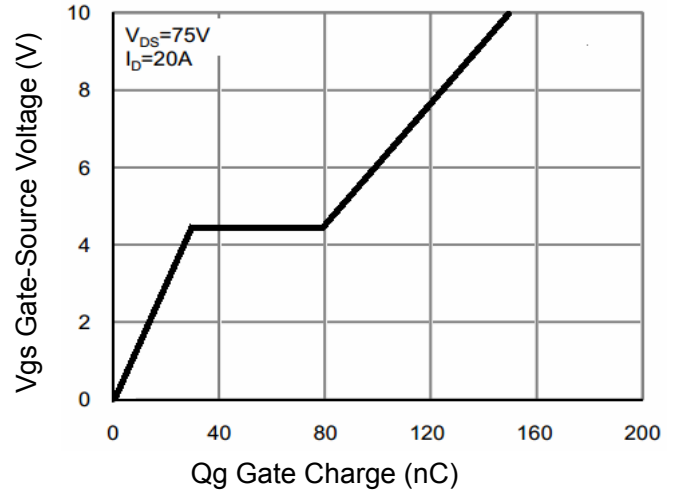


Figure 5 Gate Charge

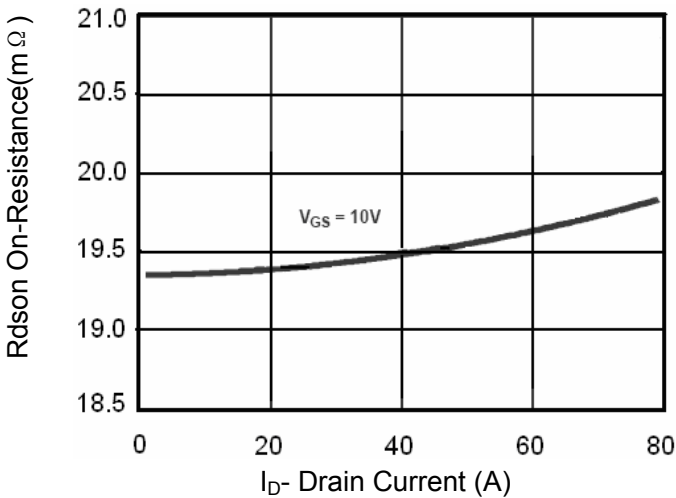


Figure 3 Rdson- Drain Current

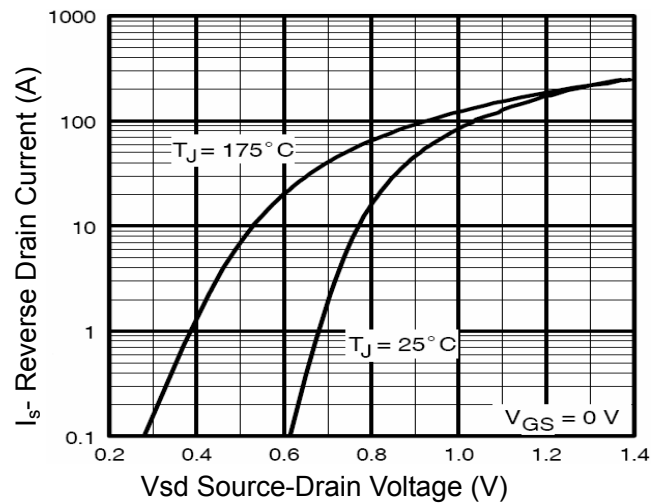


Figure 6 Source- Drain Diode Forward

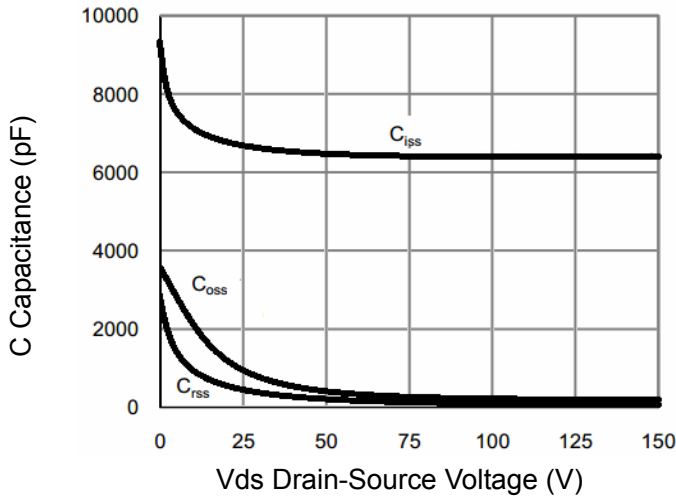


Figure 7 Capacitance vs Vds

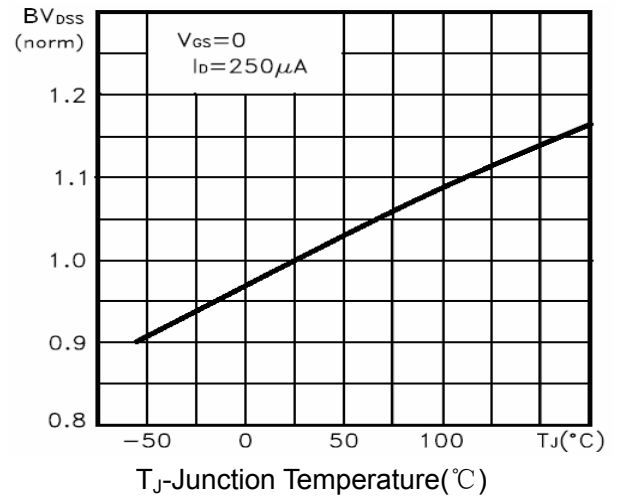


Figure 9 BV_{DSS} vs Junction Temperature

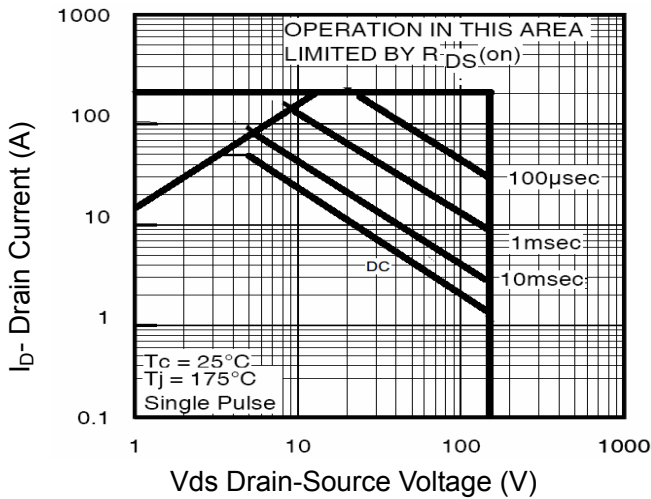


Figure 8 Safe Operation Area

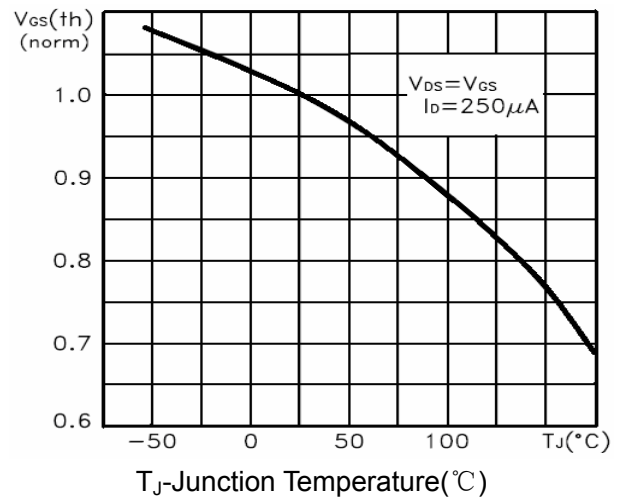


Figure 10 $V_{GS(th)}$ vs Junction Temperature

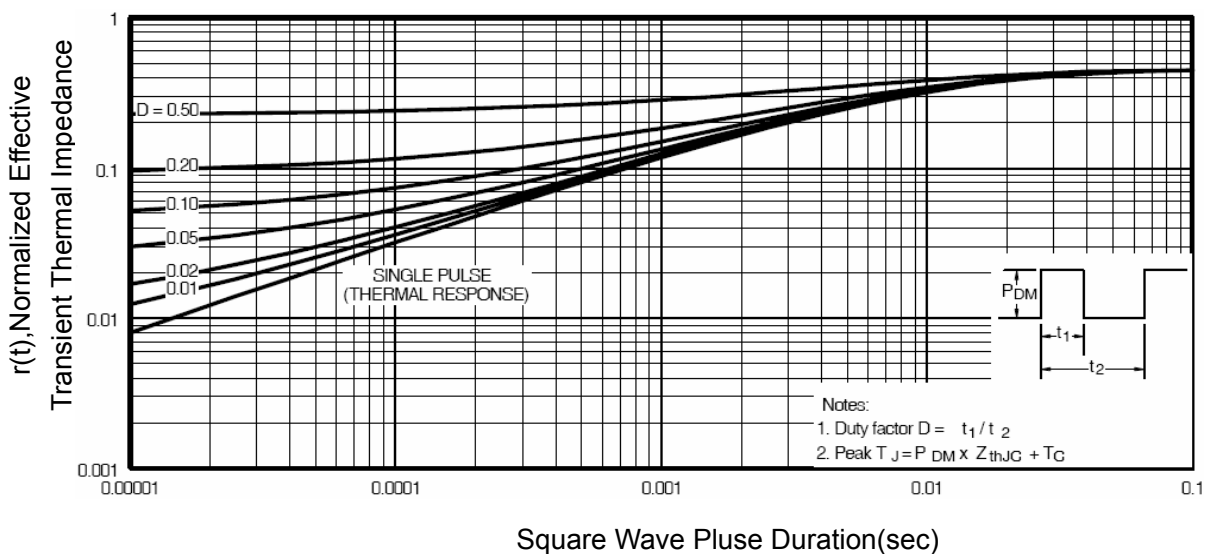
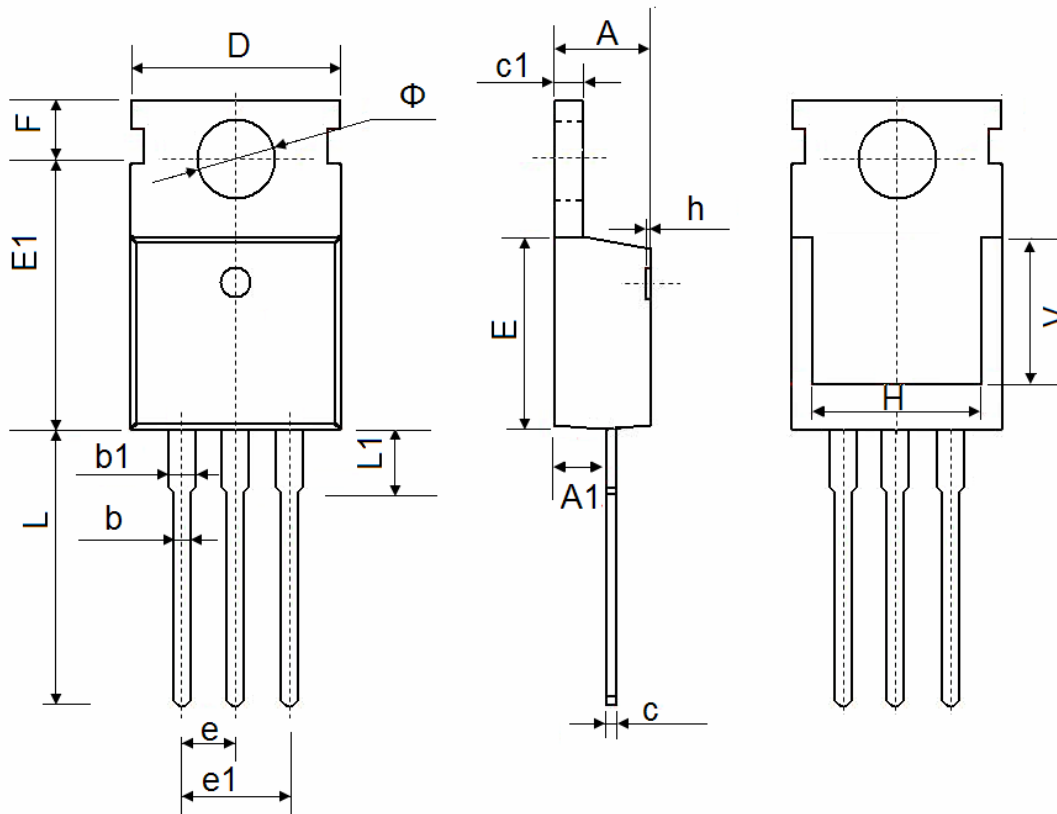


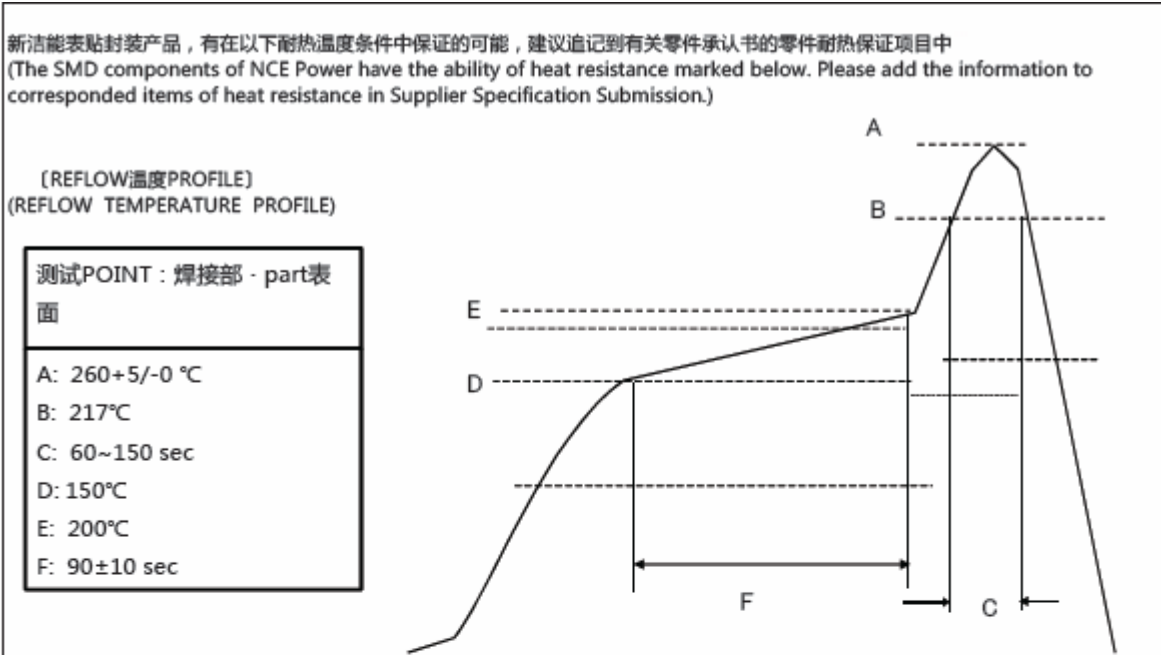
Figure 11 Normalized Maximum Transient Thermal Impedance

TO-220-3L Package Information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181
A1	2.250	2.550	0.089	0.100
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.330	0.650	0.013	0.026
c1	1.200	1.400	0.047	0.055
D	9.910	10.250	0.390	0.404
E	8.9500	9.750	0.352	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100 TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.900	13.400	0.508	0.528
L1	2.850	3.250	0.112	0.128
V	7.500 REF.		0.295 REF.	
Φ	3.400	3.800	0.134	0.150

Reflow Curve

The Guarantee Letter of Parts Heat Resistance



reflow条件(次数等) (Reflow condition (times))	<input checked="" type="checkbox"/> 可用以上PROFILE进行3次 (can use the above profile for two times) <input type="checkbox"/> 不可REFLOW (can not Reflow)		
开封后的吸湿保证条件 (Damp resistance after opening)	<input type="checkbox"/> 无限制 (保管条件 30°C 70%RH以下) (no limit) (store condition: 30 °C 70%RH below)		
	<input checked="" type="checkbox"/> 开封后 30°C 60%RH168H→REFLOW (after opening)		
手焊耐热 (Soldering iron)	350±10°C 5+1/-0 sec	flow耐热 (flow heat-resistant)	270±3°C 10+1/-0 sec
Pb含有状况 (Pb content status)	零件外部 (external)	<input checked="" type="checkbox"/> Pb完全无使用 Pb-free <input type="checkbox"/> Pb有使用其位置 (无铅化予定 年 月) Pb used in location (realize Pb-free year month)	
	零件内部 (inside)	<input type="checkbox"/> Pb完全无使用 Pb-free <input checked="" type="checkbox"/> Pb有使用其位置 (内部电极含有Pb, 无铅化予定 年 月) Pb used in the inside electrodes (realize Pb-free year month)	
	电极镀层的组成 (Composition of lead cladding)	<input checked="" type="checkbox"/> Sn, <input type="checkbox"/> Sn-Cu, <input type="checkbox"/> Sn-Ag, <input type="checkbox"/> Sn-Bi, <input type="checkbox"/> 其他(other)() <input type="checkbox"/> Sn-Pb (无铅化予定 年 月) (realize Pb-free year month)	
	无铅区分 (Pb-free manage)	<input type="checkbox"/> 料号变更 (无铅零件料号: ABC12345) P/N changed (Pb-free P/N:) <input checked="" type="checkbox"/> 料号不变,自然切换 (切换时间点: 年 月 日) P/N not changed,switch naturally (switch time: year month date)	

Solder Dip	260°C /10Sec Whole body
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