

General Description

The UV50N03 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge.

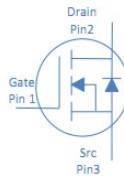
This device is suitable for use in PWM, load switching and general purpose applications.

Features

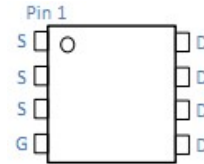
- Enhancement Mode
- Enhanced Body diode dv/dt capability
- 100% Avalanche Tested



DFN3*3-8L Top view



Schematic diagram



V_{DS}	30	V
$R_{DS(on) TYP@V_{GS}=10V}$	6.5	m Ω
$R_{DS(on) TYP@V_{GS}=4.5V}$	10	m Ω
I_D (Silicon Limited)	55	A

Applications

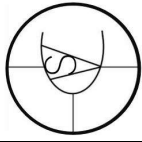
- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

Package Marking And Ordering Information

Part ID	Package Type	Marking	Tape and Reel information
UV50N03	DFN3*3-8L	UV50N03	3000pcs/Reel

Maximum ratings, at $T_j=25^\circ\text{C}$, unless otherwise specified

Symbol	Parameter	Rating	Unit	
$V_{(BR)DSS}$	Drain –Source breakdown voltage	30	V	
I_D	Continuous drain current (Silicon Limited)	$T_c=25^\circ\text{C}$	55	A
		$T_c=100^\circ\text{C}$	32	A
	Continuous drain current (Package Limited)	$T_c=25^\circ\text{C}$	60	A
I_{DM}	Pulse drain current tested①	$T_c=25^\circ\text{C}$	135	A
E_{AS}	Avalanche energy, single pulsed②	150	mJ	
P_D	Maximum power dissipation	$T_c=25^\circ\text{C}$	35	W
V_{GS}	Gate-Source voltage	± 20	V	
$T_{STG} T_J$	Storage and operating temperature range	-55 to 175	$^\circ\text{C}$	



Thermal Characteristic

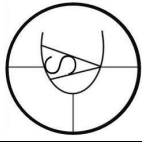
Symbol	Parameter	Typical	Unit
R_{QJC}	Thermal Resistance-Junction to Case	0.8	$^{\circ}\text{C}/\text{W}$
R_{QJA}	Thermal Resistance-Junction to Ambient	40	$^{\circ}\text{C}/\text{W}$

Typical Characteristics

Symbol	Parameter	Condition	Min	Type	Max	Unit
Static Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	30			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=24\text{V}, V_{GS}=0\text{V}$			1	μA
	Zero Gate Voltage Drain Current($T_j=100^{\circ}\text{C}$)	$V_{DS}=24\text{V}, V_{GS}=0\text{V}$			50	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$			± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.2		2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance ^③	$V_{GS}=10\text{V}, I_D=20\text{A}$		6.5	9	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}, I_D=20\text{A}$		10	14	$\text{m}\Omega$
Dynamic Electrical Characteristics @ $T_j=25^{\circ}\text{C}$ (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=15\text{V},$		1150		PF
C_{oss}	Output Capacitance	$V_{GS}=0\text{V},$		230		PF
C_{rss}	Reverse Transfer Capacitance	$F=1\text{MHz}$		113		PF
Q_g	Total Gate Charge	$V_{DS}=24\text{V},$		13		nC
Q_{gs}	Gate-Source Charge	$I_D=20\text{A},$		4		nC
Q_{gd}	Gate-Drain Charge	$V_{GS}=10\text{V}$		6		nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay time	$V_{DD}=15\text{V}$		7		nS
t_r	Turn-on Rise time	$I_D=20\text{A}$		11		nS
$t_{d(off)}$	Turn-off Delay time	$R_G=3.3\ \Omega$		16		nS
t_f	Turn-off Fall time	$V_{GS}=10\text{V}$		5		nS
Source-Drain Diode Characteristics						
V_{SD}	Forward on voltage	$I_{SD}=20\text{A}, V_{GS}=0\text{V}$		0.8	1.2	V
t_{rr}	Reverse Recovery Time	$T_j=25^{\circ}\text{C}, I_{SD}=20\text{A}$		15		nS
Q_{rr}	Reverse Recovery Charge	$V_{GS}=0\text{V}, di/dt=300\text{A}/\mu\text{s}$		8		nC

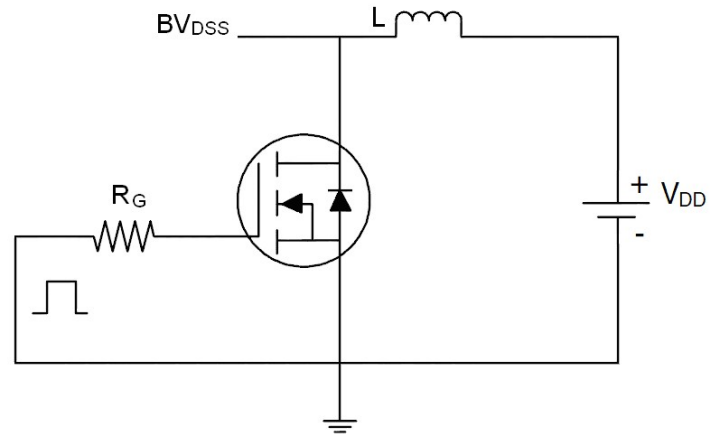
Note:

- ① Repetitive rating; pulse width limited by max, junction temperature.
- ② Limited by T_{jmax} , starting $T_j=25^{\circ}\text{C}$, $L=0.1\text{mH}$, $R_G=2\ \Omega$, $I_{AS}=5\text{A}$, $V_{GS}=10\text{V}$, Part not recommended for use above this value
- ③ Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$

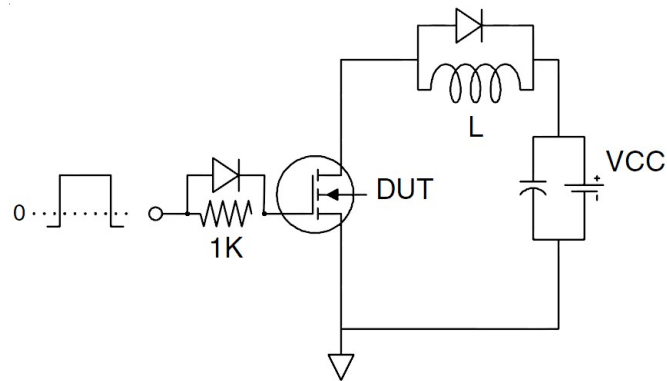


Test circuit

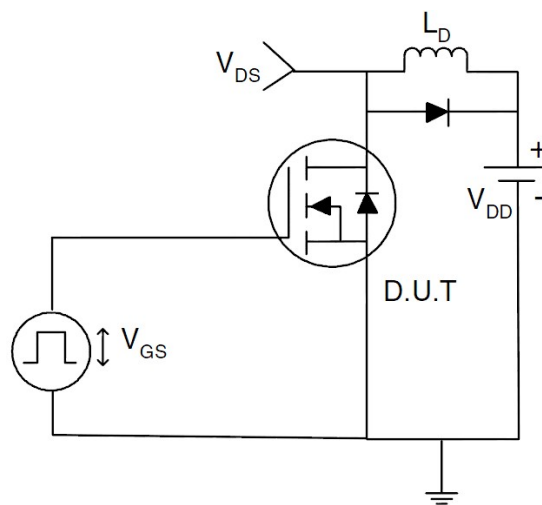
(1) E_{AS} test circuits

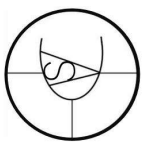


(2) Gate charge test circuit



(3) Switch time test circuit





Typical Operating Characteristics

Figure 1: Power Dissipation

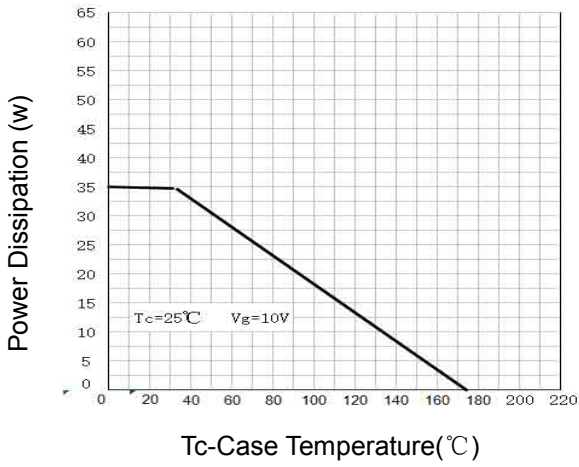


Figure 2: Drain Current

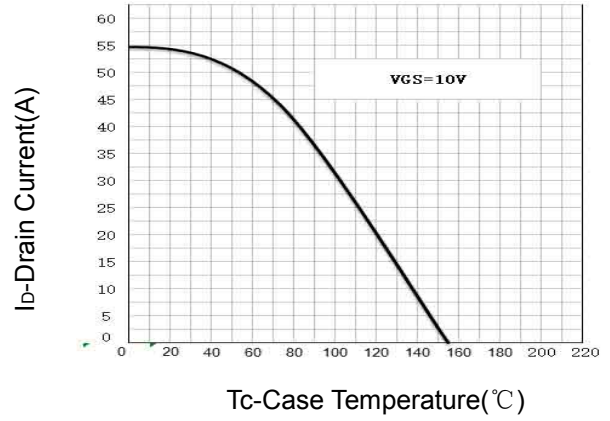


Figure 3: Safe Operation Area

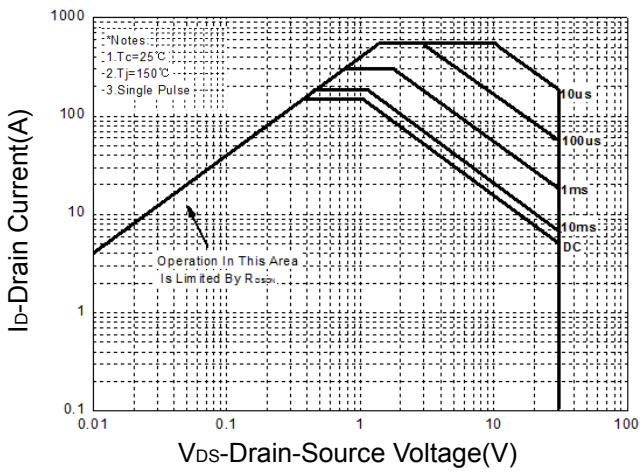


Figure 4: Thermal Transient Impedance

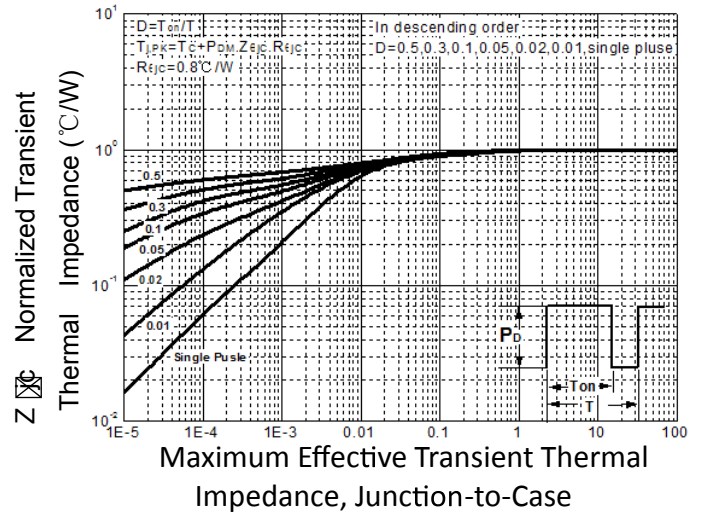


Figure 5: Output Characteristics

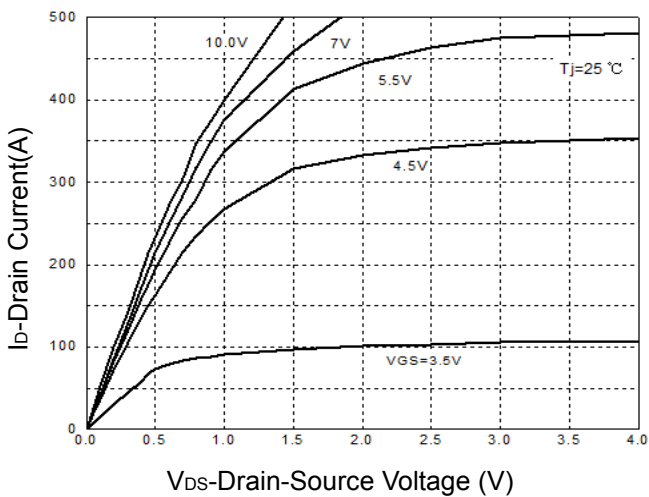
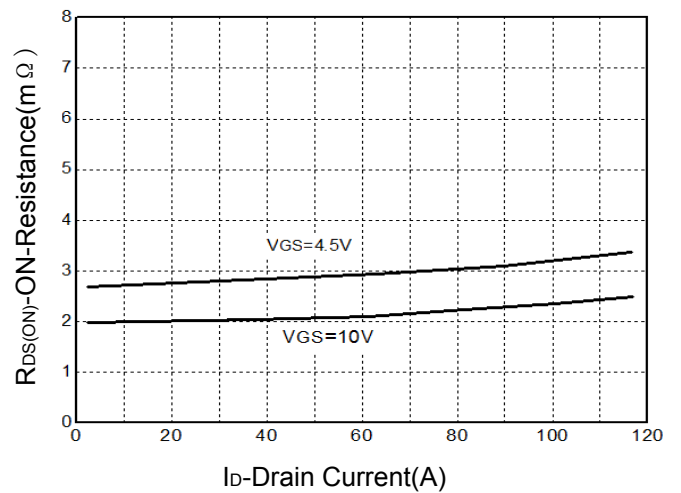
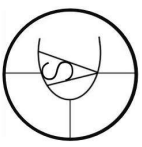


Figure 6: Drain-Source On Resistance





Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

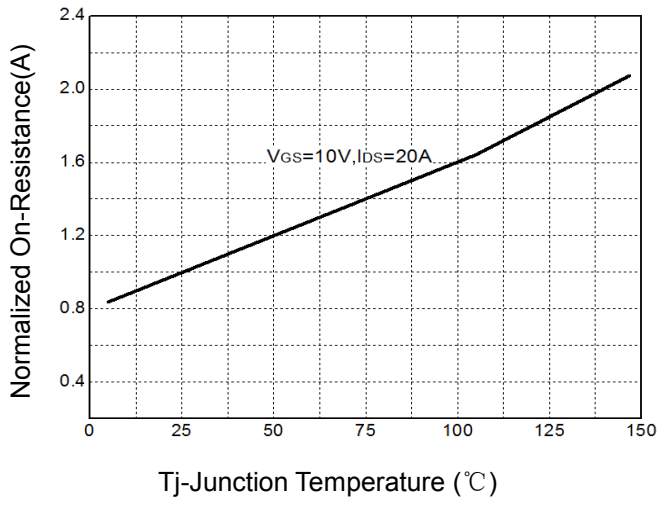


Figure 8: Source-Drain Diode Forward

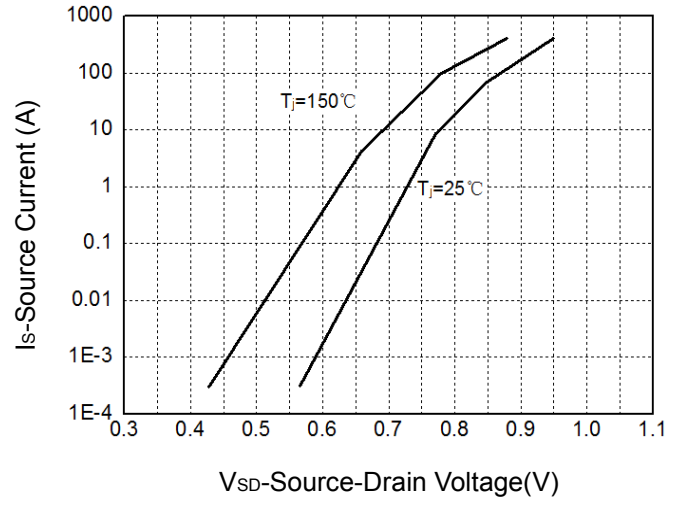


Figure 9: Capacitance Characteristics

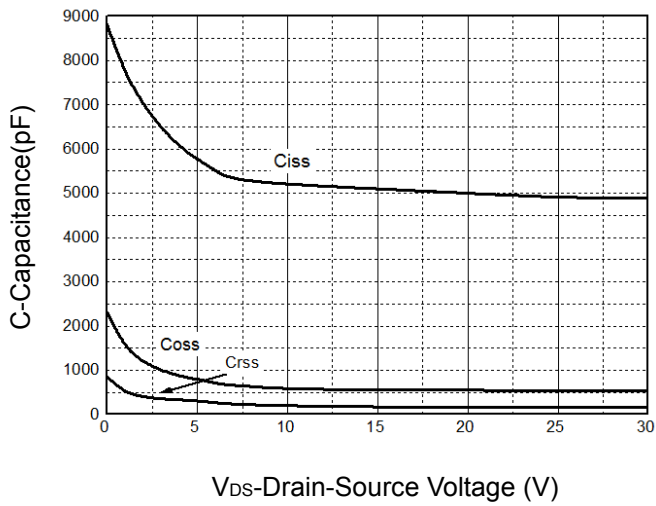
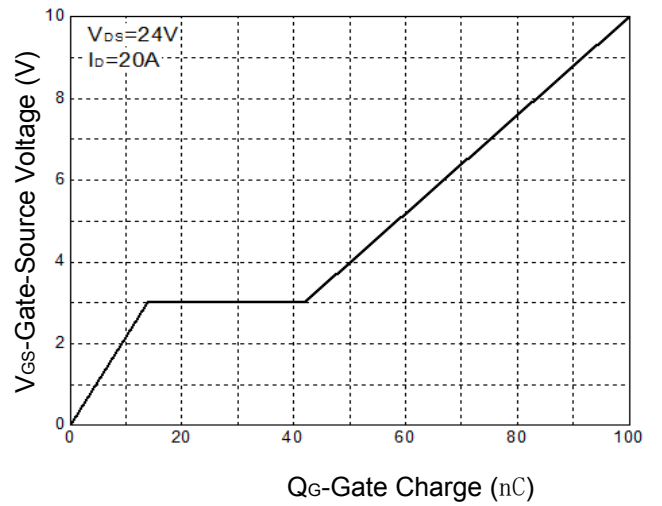
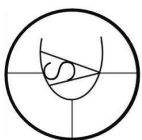


Figure 10: Gate Charge Characteristics



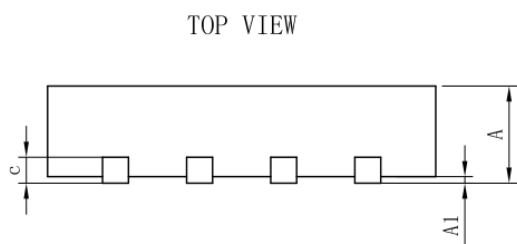
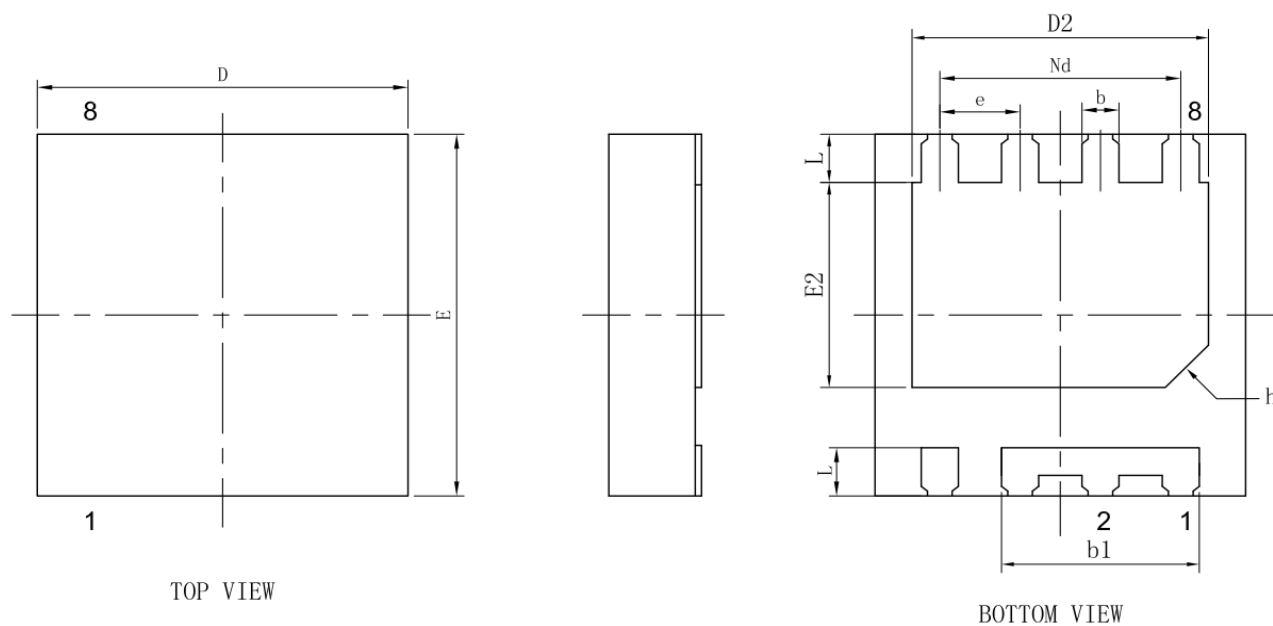


Device Per Unit

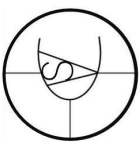
Package Type	Unit	Quantity
DFN3*3-8L	Reel	3000

Package Information

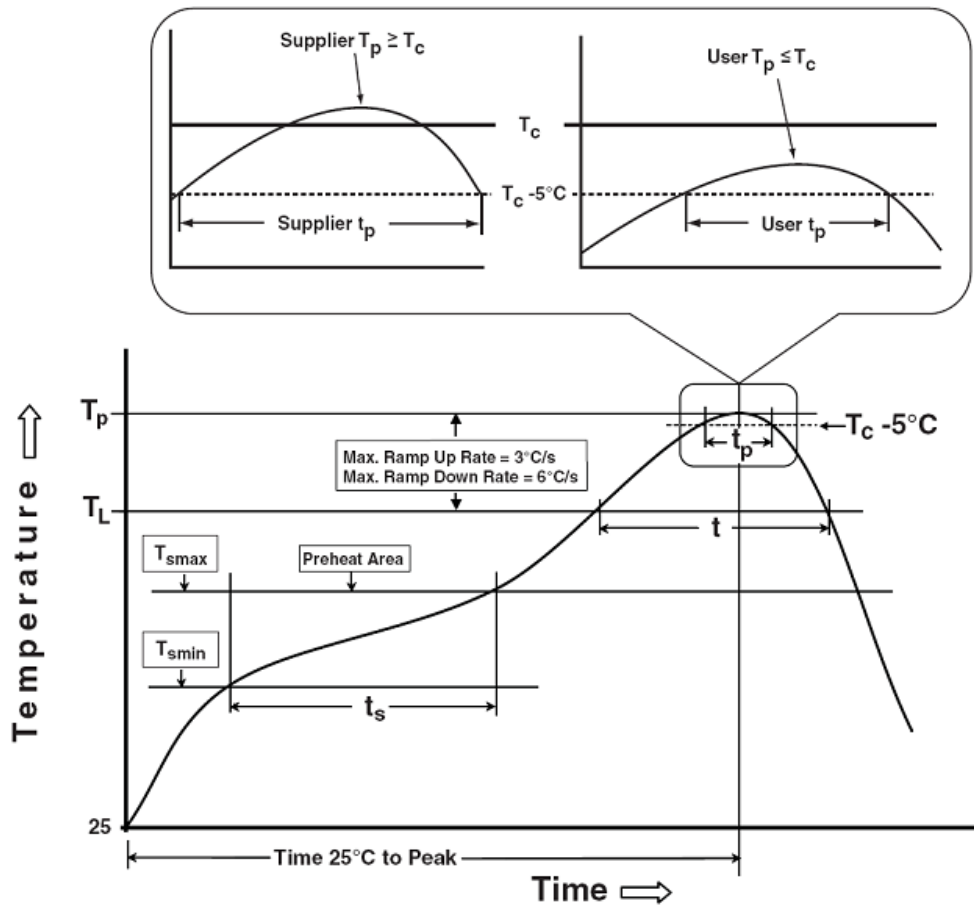
DFN3*3-8L



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
b	0.25	0.30	0.35
b1	1.55	1.60	165.00
c	0.19	0.20	0.21
D	2.90	3.00	3.10
D2	2.30	2.40	2.50
Nd	1.90	1.95	2.00
E	2.90	3.00	3.10
E2	1.60	1.70	1.80
e	0.65b _{sc}		
L	0.35	0.40	0.45
h	0.30	0.35	0.40



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T_{smin})	100 °C	150 °C
Temperature max (T_{smax})	150 °C	200 °C
Time (T_{smin} to T_{smax}) (t_s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T_{smax} to T_p)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L)	183 °C	217 °C
Time at liquidous (t_L)	60-150 seconds	60-150 seconds
Peak package body Temperature (T_p)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (t_p)** within 5°C of the specified classification temperature (T_c)	20** seconds	30** seconds
Average ramp-down rate (T_p to T_{smax})	6 °C/second max.	6 °C/second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

*Tolerance for peak profile Temperature (T_p) is defined as a supplier minimum and a user maximum.

** Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

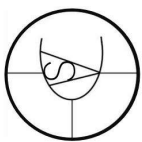


Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

Package Thickness	Volume mm ³ <350	Volume mm ³ ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2. Pb-free Process – Classification Temperatures (Tc)

Package Thickness	Volume mm ³ <350	Volume mm ³ 350-2000	Volume mm ³ ≥2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

Reliability Test Program

Test item	Method	Description
SOLDERABILITY	JESD-22, B102	5 Sec, 245°C
HTRB	JESD-22, A108	168/500/1000Hrs, Bias @ 150°C
PCT	JESD-22, A102	96 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -55°C~150°C

Customer Service

Worldwide Sale and Service: Kentyang2002@163.com

Shenzhen UVsemiconductor CO., Ltd

Room 508, 5th Floor, Lian wang Building, No. 4137-4151 Long gang Avenue, Long gang District, Shenzhen, China

Tel: (86)-13828802921