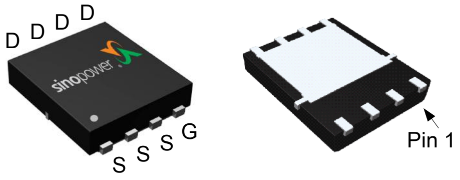
SM4382NAKP

N-Channel Enhancement Mode MOSFET

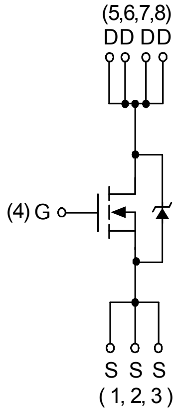
Features

- 30V/100A,
  $R_{DS(ON)}$ = 2.4mΩ (max.) @ V_{GS} =10V
  $R_{DS(ON)}$ = 3.2mΩ (max.) @ V_{GS} =4.5V
- 100% UIS Tested
- Reliable and Rugged
- Lead Free Available (RoHS Compliant)
- Integrated Schottky Diode

Pin Description



DFN5x6-8



N-Channel MOSFET

Applications

- Synchronous Rectifier for DC/DC Converters.
- NB Vcore low side switch.
- Networking Point of Load low side switch.
- Secondary side rectification.

Ordering and Marking Information

SM4382NA □□□-□□ □ Assembly Material Handling Code Temperature Range Package Code	Package Code KP : DFN5x6-8 Operating Junction Temperature Range C : -55 to 150 °C Handling Code TR : Tape & Reel (2500ea/reel) Assembly Material G : Halogen and Lead Free Device
SM4382NA KP : 	XXXXX - Date Code

Note : SINOPOWER lead-free products contain molding compounds/die attach materials and 100% matte tin plate termination finish; which are fully compliant with RoHS. SINOPOWER lead-free products meet or exceed the lead-free requirements of IPC/JEDEC J-STD-020D for MSL classification at lead-free peak reflow temperature. SINOPOWER defines “Green” to mean lead-free (RoHS compliant) and halogen free (Br or Cl does not exceed 900ppm by weight in homogeneous material and total of Br and Cl does not exceed 1500ppm by weight).

Absolute Maximum Ratings (T$_A$ = 25°C unless otherwise noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		30	V
V_{GSS}	Gate-Source Voltage		±20	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	
I_S	Diode Continuous Forward Current	T_C=25°C	30	A
I_D	Continuous Drain Current	T_C=25°C	100[a]	
		T_C=100°C	83	
I_{DM} [b]	Pulse Drain Current	T_C=25°C	200	
P_D	Maximum Power Dissipation	T_C=25°C	62.5	W
		T_C=100°C	25	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2	°C/W
I_D	Continuous Drain Current	T_A=25°C	34	A
		T_A=70°C	27	
P_D	Maximum Power Dissipation	T_A=25°C	4.2	W
		T_A=70°C	2.7	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	$t \leq 10s$	15	°C/W
		Steady State	30	
I_{AS} [c]	Avalanche Current, Single pulse	L=0.1mH	50	A
E_{AS} [c]	Avalanche Energy, Single pulse	L=0.1mH	125	mJ

Note a：Max. current is limited by bonding wire.

Note b：Pulse width limited by max. junction temperature.

Note c：UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

Electrical Characteristics (T$_A$ = 25°C unless otherwise noted)

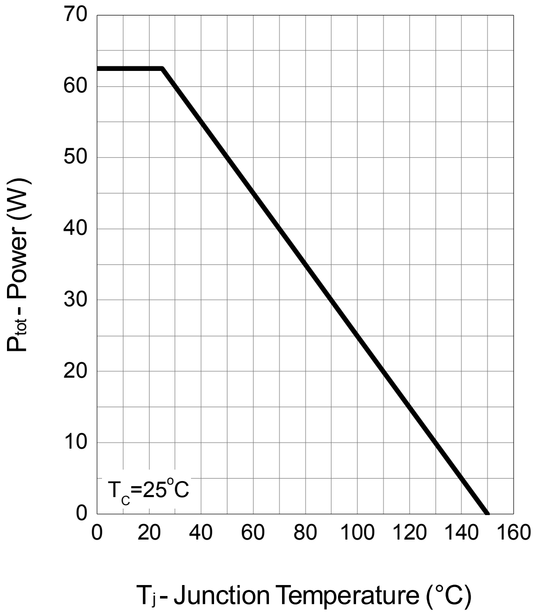
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=24V, V_{GS}=0V	-	-	50	μA
		T_J=85°C	-	-	5	mA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	1.4	1.7	2.5	V
I_{GSS}	Gate Leakage Current	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [d]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=20A	-	1.9	2.4	mΩ
		T_J=125°C	-	2.9	-	
		V_{GS}=4.5V, I_{DS}=15A	-	2.4	3.2	
Gfs	Forward Transconductance	V_{DS}=5V, I_{DS}=10A	-	27	-	S
Diode Characteristics						
V_{SD} [d]	Diode Forward Voltage	I_{SD}=1A, V_{GS}=0V	-	0.35	0.55	V
		I_{SD}=20A, V_{GS}=0V	-	0.75	1.1	
t_{rr}	Reverse Recovery Time	I_{SD}=15A, dI_{SD}/dt=100A/μs	-	27	-	ns
t_a	Charge Time		-	13	-	
t_b	Discharge Time		-	14	-	
Q_{rr}	Reverse Recovery Charge		-	17	-	nC
Dynamic Characteristics [e]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	0.6	0.8	1.5	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, Frequency=1.0MHz	2560	3200	3850	pF
C_{oss}	Output Capacitance		560	680	800	
C_{rss}	Reverse Transfer Capacitance		260	320	420	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=15V, R_L=15Ω, I_{DS}=1A, V_{GEN}=10V, R_G=6Ω	-	20	24	ns
t_r	Turn-on Rise Time		-	12	15	
$t_{d(OFF)}$	Turn-off Delay Time		-	69	78	
t_f	Turn-off Fall Time		-	29	34	
Gate Charge Characteristics [e]						
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=10V, I_{DS}=30A	-	58	69	nC
Q_g	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=30A	-	26	31	
Q_{gth}	Threshold Gate Charge		-	3.5	4.2	
Q_{gs}	Gate-Source Charge		-	9.5	11.4	
Q_{gd}	Gate-Drain Charge		-	11.4	14	

Note d：Pulse test; pulse width≤300μs, duty cycle≤2%.

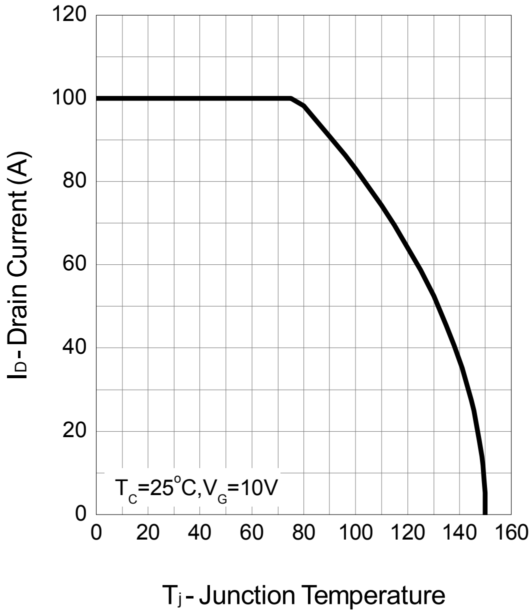
Note e：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

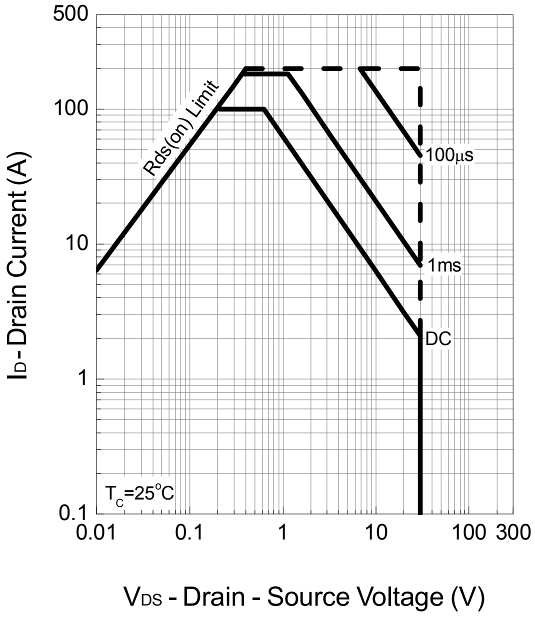
Power Dissipation



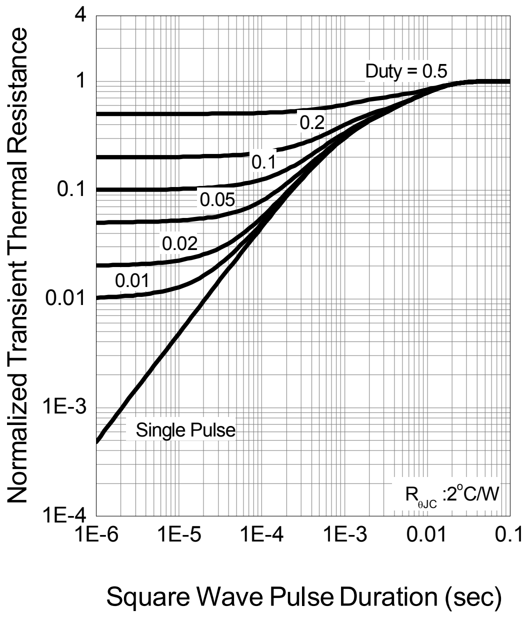
Drain Current



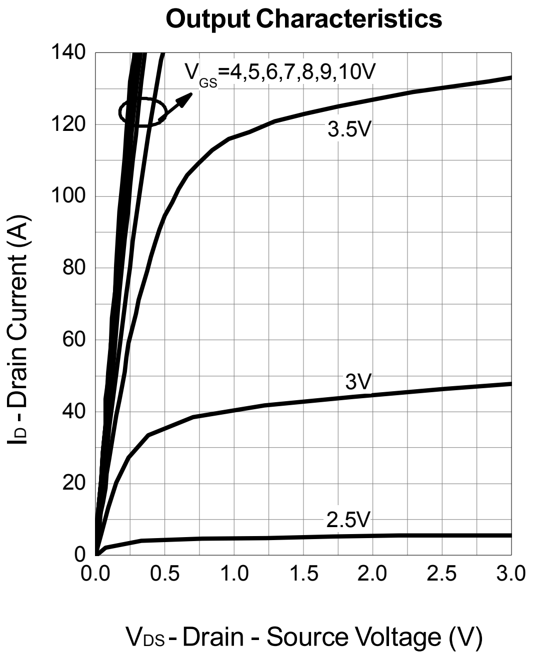
Safe Operation Area



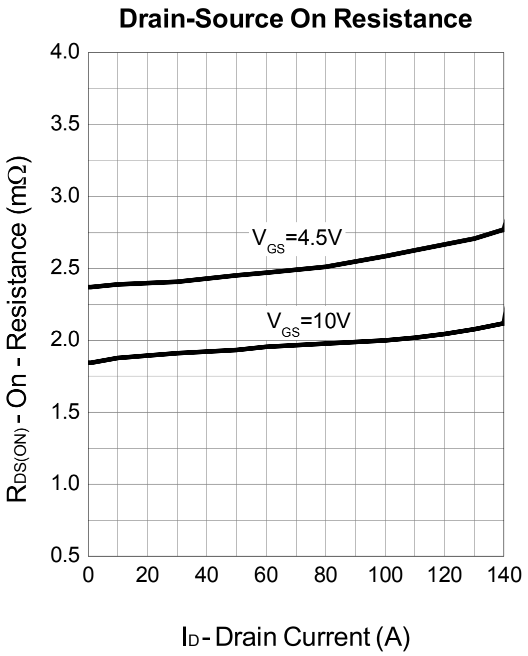
Thermal Transient Impedance



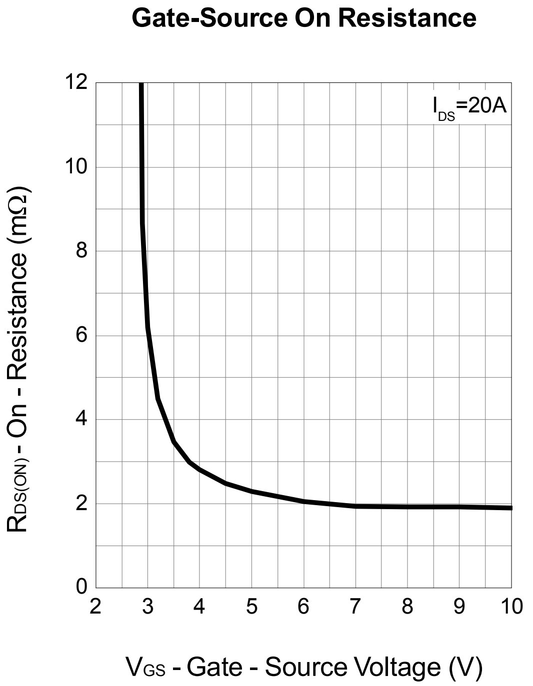
Typical Operating Characteristics (Cont.)



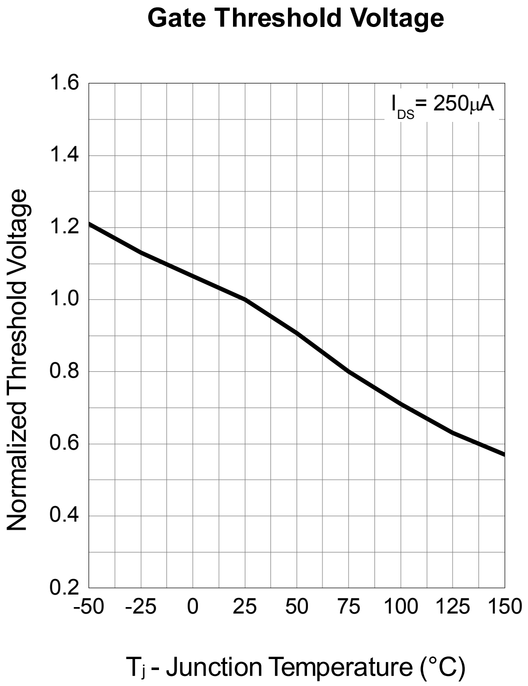
Output Characteristics



Drain-Source On Resistance

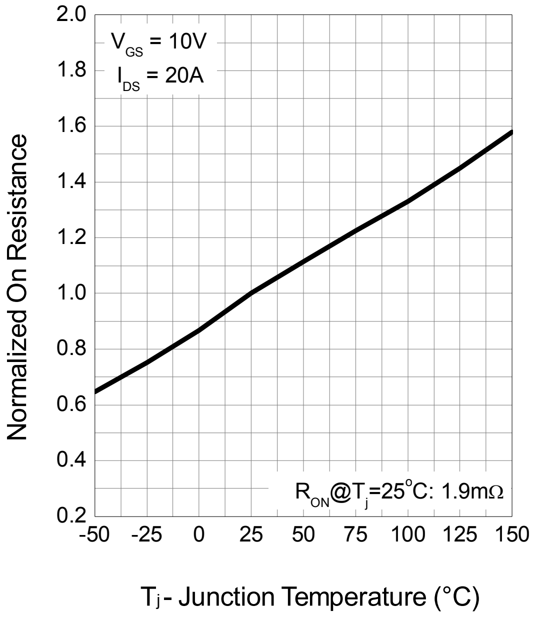


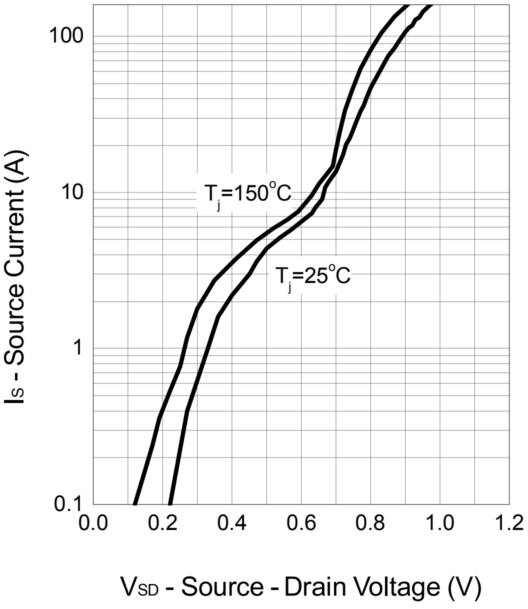
Gate-Source On Resistance

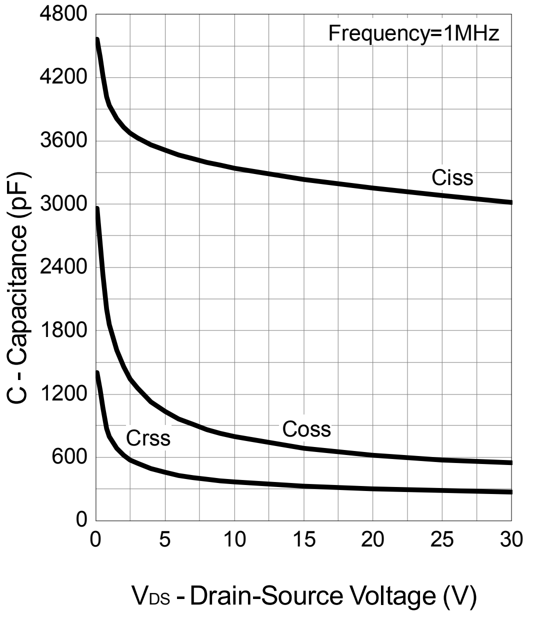


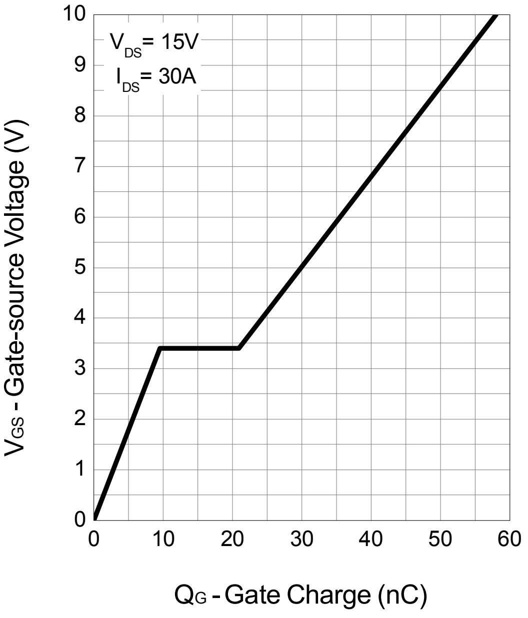
Gate Threshold Voltage

Typical Operating Characteristics (Cont.)


Drain-Source On Resistance

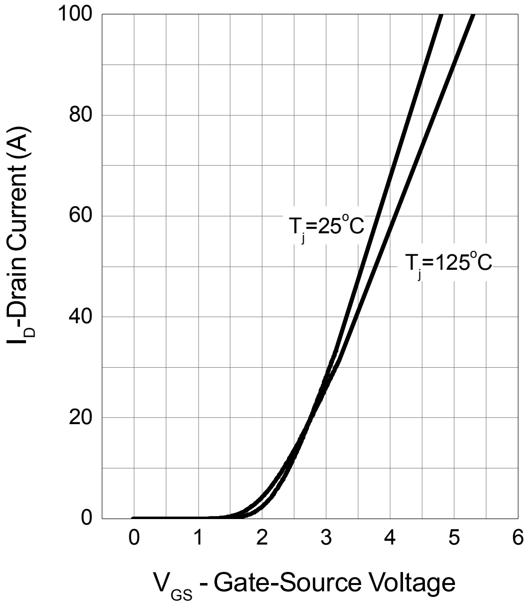

Source-Drain Diode Forward


Capacitance


Gate Charge

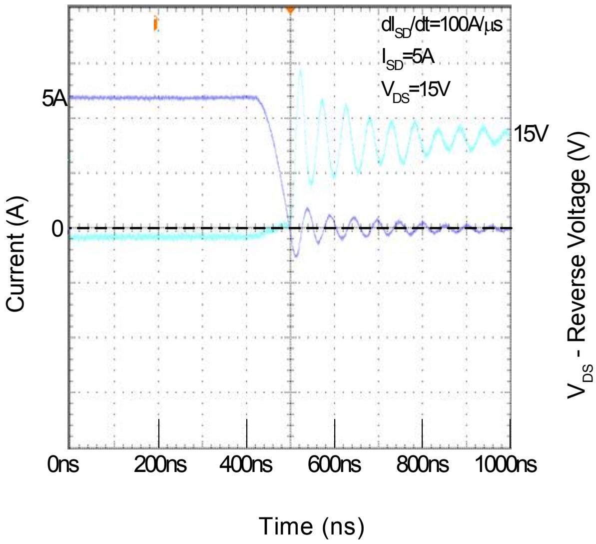
Typical Operating Characteristics (Cont.)

Transfer Characteristics

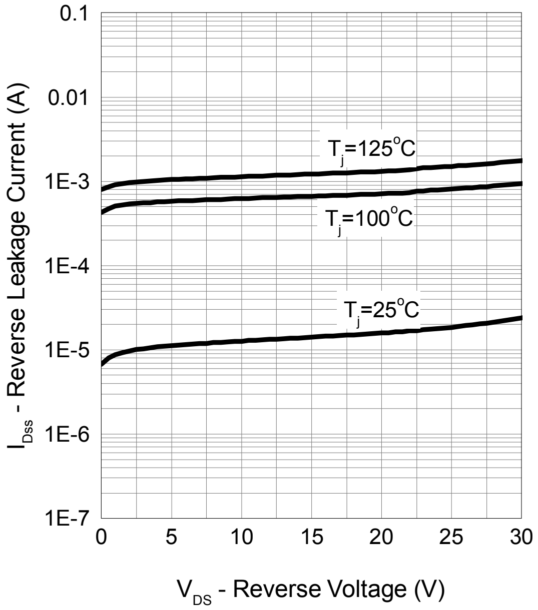


Schottky Body Diode Characteristics

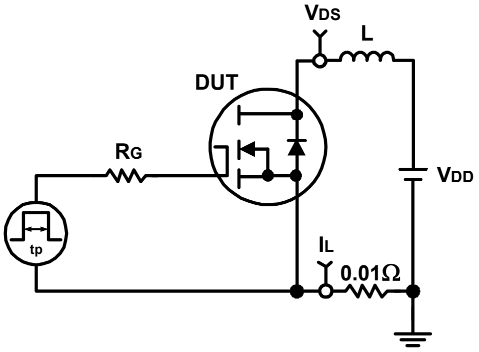
Body Diode Reverse Recovery Diode Characteristics

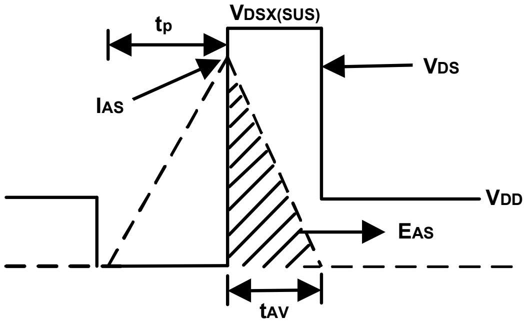


Body Diode Reverse Leakage Current

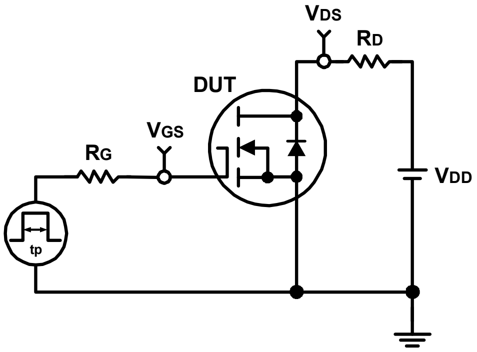


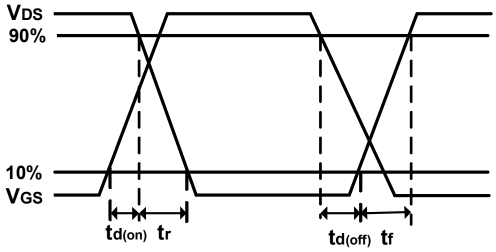
Avalanche Test Circuit and Waveforms





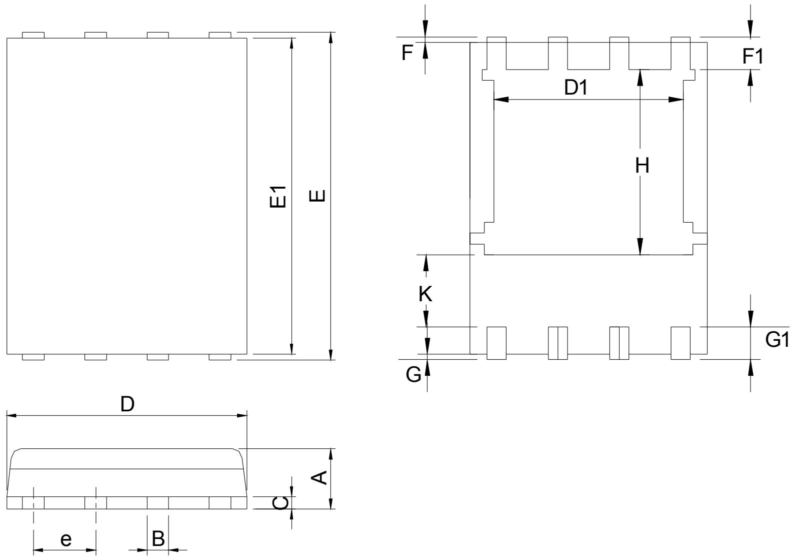
Switching Time Test Circuit and Waveforms





Package Information

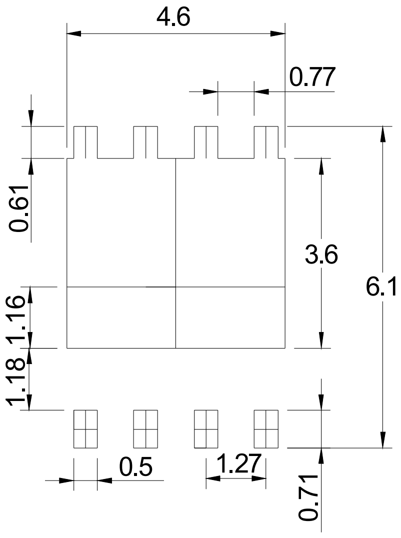
DFN5x6-8



SYMBOL	DFN5x6-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.90	1.20	0.035	0.047
B	0.3	0.51	0.012	0.020
C	0.19	0.25	0.007	0.010
D	4.80	5.30	0.189	0.209
D1	4.00	4.40	0.157	0.173
E	5.90	6.20	0.232	0.244
E1	5.50	5.80	0.217	0.228
e	1.27 BSC		0.050 BSC	
F	0.05	0.30	0.002	0.012
F1	0.35	0.75	0.014	0.030
G	0.05	0.30	0.002	0.012
G1	0.35	0.75	0.014	0.030
H	3.34	3.9	0.131	0.154
K	0.762	-	0.03	-

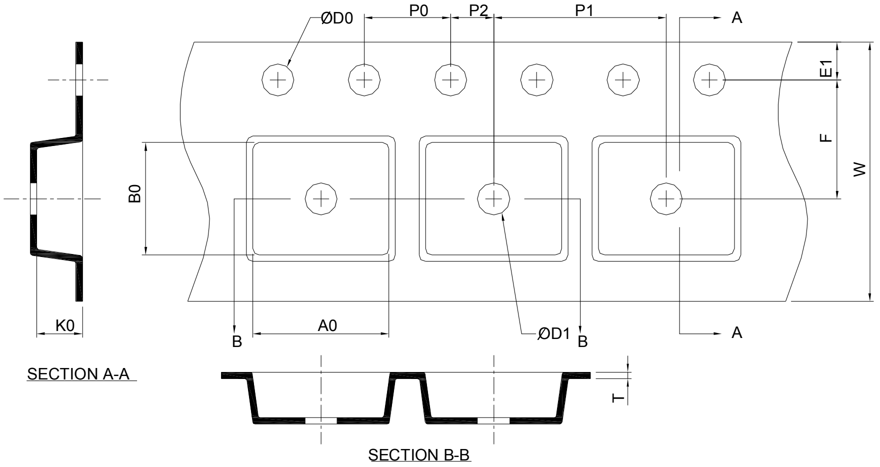
Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.
Mold flash or protrusions shall not exceed 10 mil.

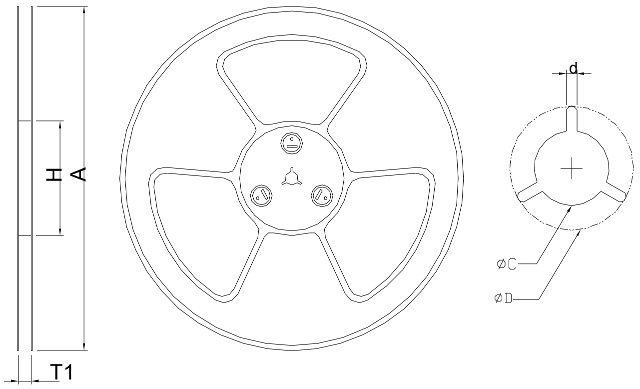
RECOMMENDED LAND PATTERN



UNIT: mm

Carrier Tape & Reel Dimensions



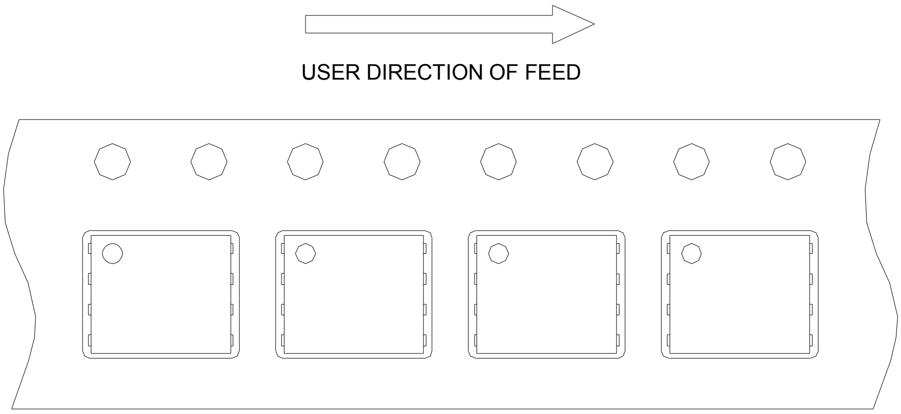


Application	A	H	T1	C	d	D	W	E1	F
DFN5x6-8	330.0±2.00	50 MIN.	12.4+2.00 -0.00	13.0+0.50 -0.20	1.5 MIN.	20.2 MIN.	12.0±0.30	1.75±0.10	5.5±0.05
	P0	**P1**	**P2**	**D0**	**D1**	**T**	**A0**	**B0**	**K0**
	4.0±0.10	8.0±0.10	2.0±0.05	1.5+0.10 -0.00	1.5 MIN.	0.6+0.00 -0.4	6.5±0.20	5.3±0.20	1.4±0.20

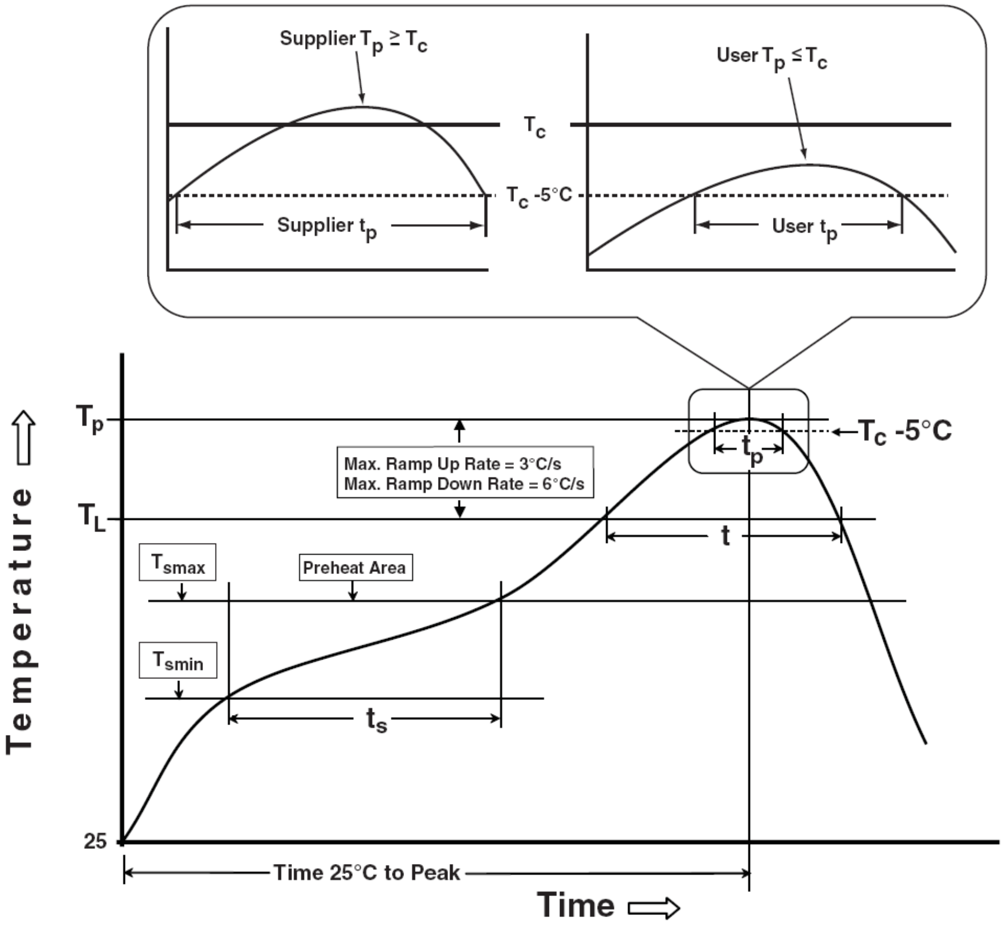
(mm)

Taping Direction Information

DFN5x6-8



Classification Profile



Classification Reflow Profiles

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak Temperature min (T_{smin}) Temperature max (T_{smax}) Time (T_{smin} to T_{smax}) (t_s)	100 °C 150 °C 60-120 seconds	150 °C 200 °C 60-120 seconds
Average ramp-up rate (T_{smax} to T_P)	3 °C/second max.	3°C/second max.
Liquidous temperature (T_L) Time at liquidous (t_L)	183 °C 60-150 seconds	217 °C 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	1000 Hrs, 80% of VDS max @ Tjmax
HTGB	JESD-22, A108	1000 Hrs, 100% of VGS max @ Tjmax
PCT	JESD-22, A102	168 Hrs, 100%RH, 2atm, 121°C
TCT	JESD-22, A104	500 Cycles, -65°C~150°C

Customer Service

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