

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
30V	0.57mΩ@10V	320A
	1.0mΩ@4.5V	



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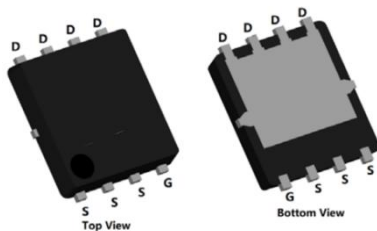
Feature

- Fast Switching
- Low Gate Charge and Rdson
- Cu-Clip Process
- Advanced Split Gate Trench Technology
- 100% Single Pulse avalanche energy Test
- 175°C Junction Temperature

Applications

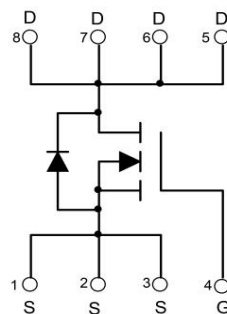
- PWM Application
- Hard switched and high frequency circuits
- Power Management

Package

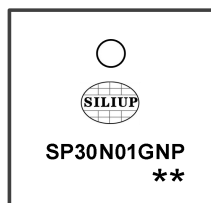


PDFN5X6-8L

Circuit diagram



Marking



SP30N01GNP :Device Code
** :Week Code

Order Information

Device	Package	Unit/Tape
SP30N01GNP	PDFN5X6-8L	5000

Absolute maximum ratings (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	320	A
Continuous Drain Current (Tc=100°C)	I_D	241	A
Pulsed Drain Current	I_{DM}	1280	A
Single Pulse Avalanche Energy ¹	E_{AS}	645	mJ
Power Dissipation (Tc=25°C)	P_D	156	W
Power Dissipation (Tc=100°C)	P_D	78	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	0.96	°C/W
Storage Temperature Range	T_{STG}	-55 to 175	°C
Operating Junction Temperature Range	T_J	-55 to 175	°C

Electrical characteristics (Ta=25°C, unless otherwise noted)

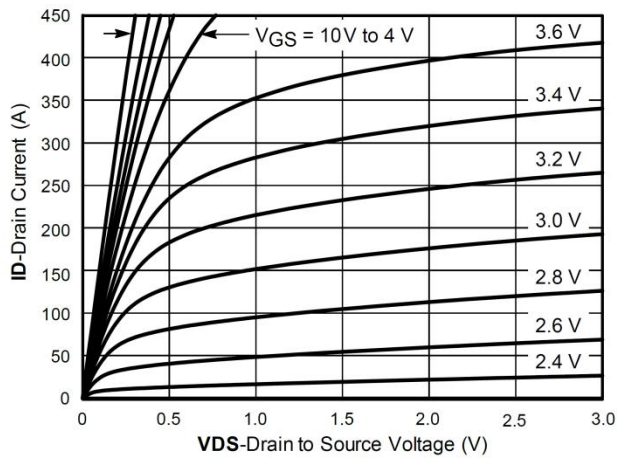
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	B _V DSS	VGS=0V , ID=250uA	30	-	-	V
Drain-Source Leakage Current	I _{DSS}	VDS=24V , VGS=0V , TJ=25℃	-	-	1	uA
Gate-Source Leakage Current	I _{GSS}	VGS=±20V , VDS=0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	VGS=VDS , ID =250uA	1.4	1.8	2.4	V
Static Drain-Source On-Resistance	R _{DS(ON)}	VGS=10V , ID=20A	-	0.57	0.72	mΩ
		VGS=4.5V , ID=20A	-	1.0	1.35	
Gate Resistance	R _G	VDS=15V , VGS=0V , f=1MHz	-	4.1	-	Ω
Dynamic characteristics						
Input Capacitance	C _{iss}	VDS=15V , VGS=0V , f=1MHz	-	4529	-	pF
Output Capacitance	C _{oss}		-	2993	-	
Reverse Transfer Capacitance	C _{rss}		-	31	-	
Total Gate Charge	Q _g	VDS=15V , VGS=10V , ID=40A	-	62	-	nC
Gate-Source Charge	Q _{gs}		-	14	-	
Gate-Drain Charge	Q _{gd}		-	8	-	
Gate Plateau Vlotage	V _{plateau}		-	3.2	-	V
Switching Characteristics						
Turn-On Delay Time	T _{d(on)}	VDD=15V , VGS=10V , RG=1.6Ω ID=40A	-	10.5	-	nS
Rise Time	T _r		-	41	-	
Turn-Off Delay Time	T _{d(off)}		-	72	-	
Fall Time	T _f		-	17	-	
Diode Characteristics						
Diode Forward Voltage	V _{SD}	VGS=0V , IS=1A , TJ=25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	320	A
Reverse Recovery Time	T _{rr}	IS=100A , di/dt=100A/us , TJ=25℃	-	30	-	nS
Reverse Recovery Charge	Q _{rr}		-	65	-	nC

Note :

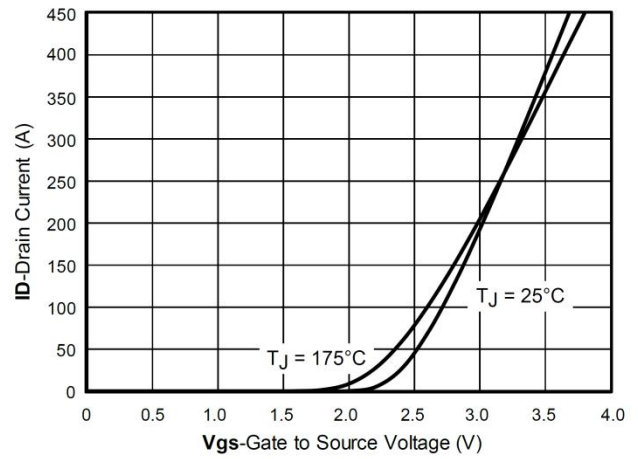
1. The test condition is $V_{DD}=20V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$



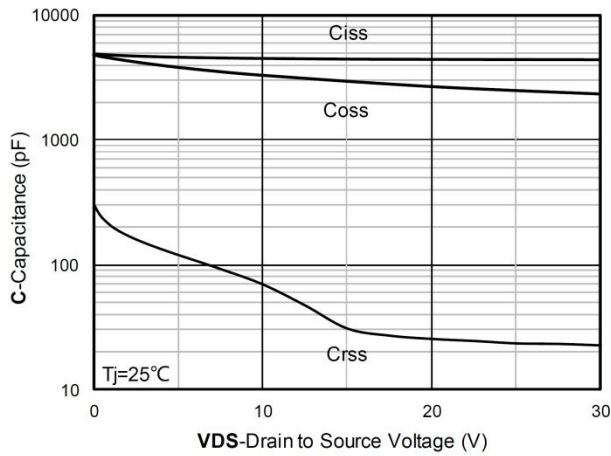
Typical Characteristics



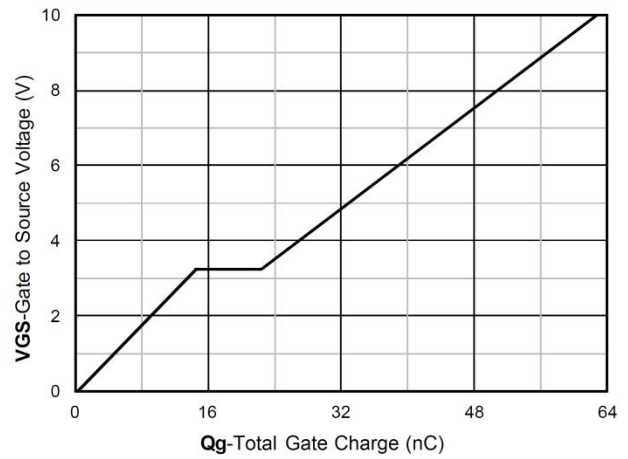
Output Characteristics



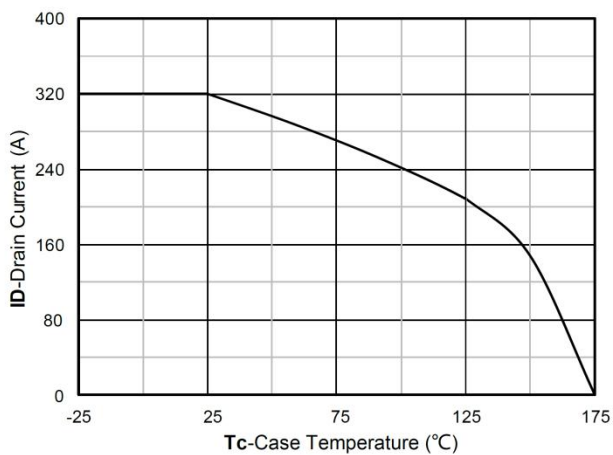
Transfer Characteristics



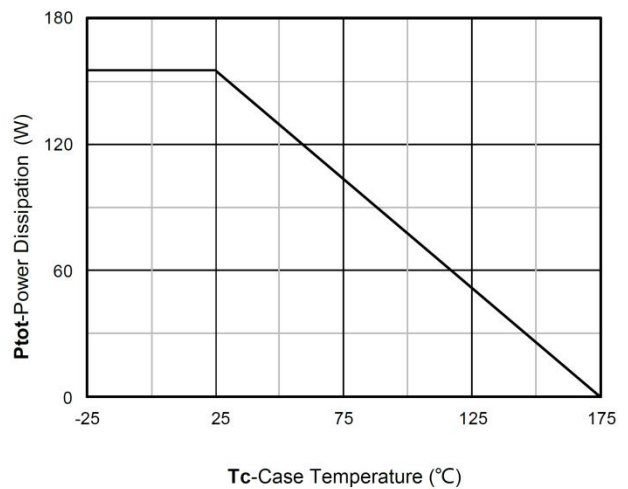
Capacitance Characteristics



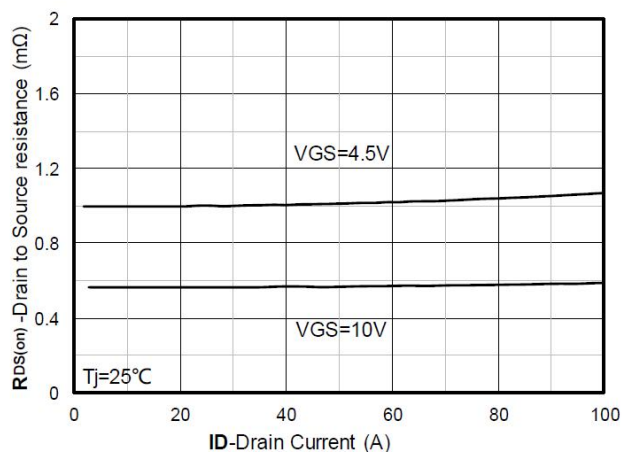
Gate Charge



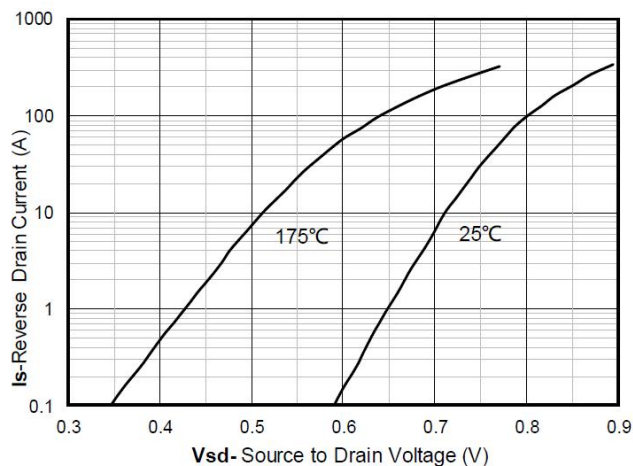
Current dissipation



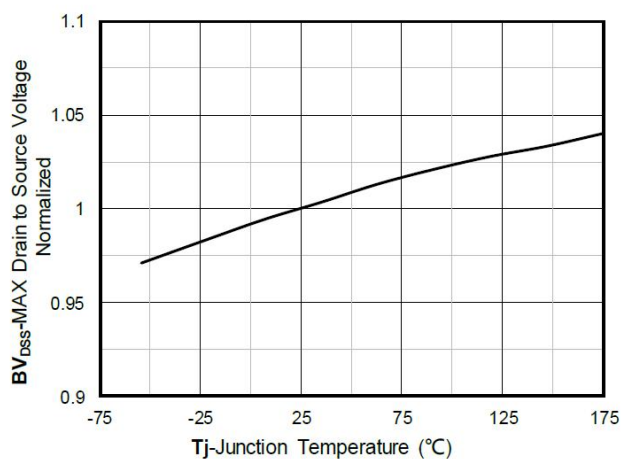
Power dissipation



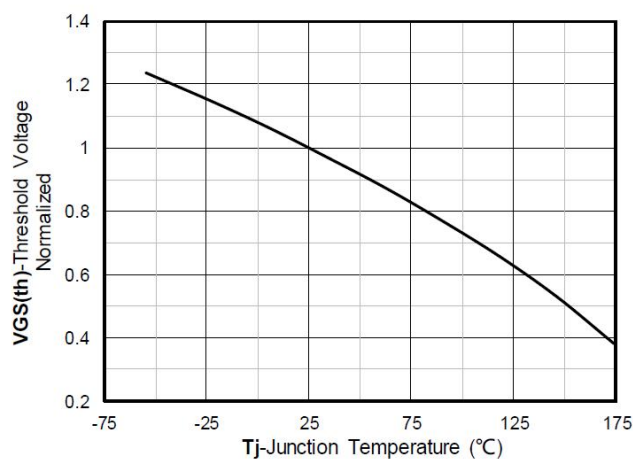
RDS(on) VS Drain Current



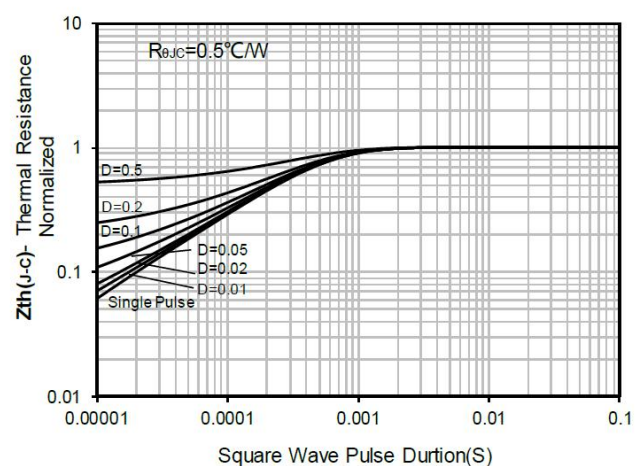
Forward characteristics of reverse diode



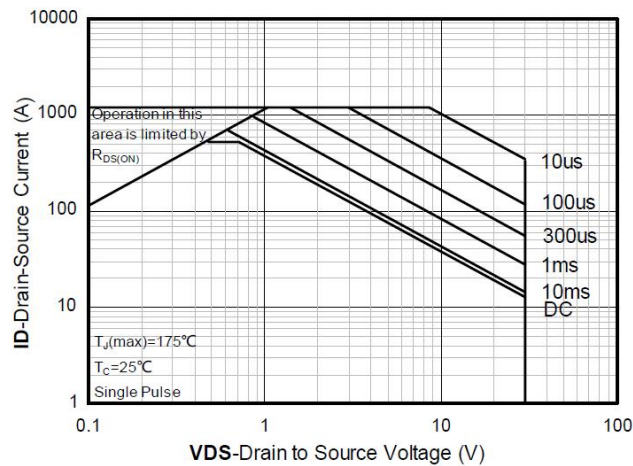
Normalized breakdown voltage



Normalized Threshold voltage



Maximum Transient Thermal Impedance

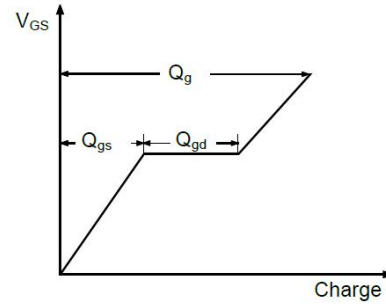
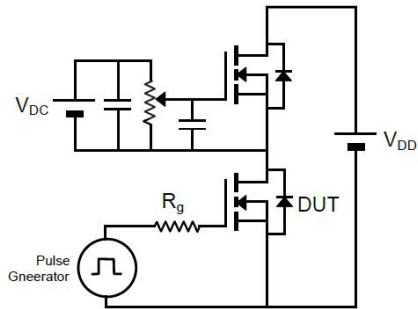


Safe Operation Area

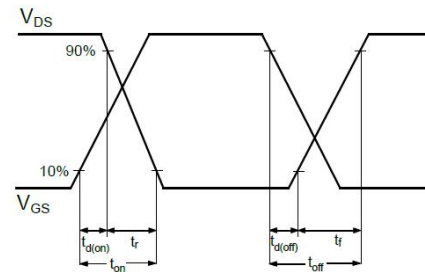
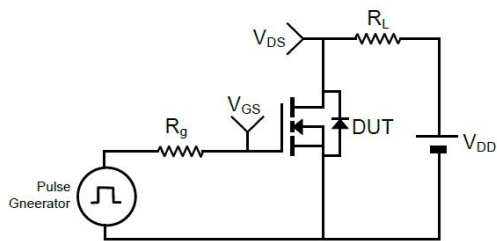


Test Circuit

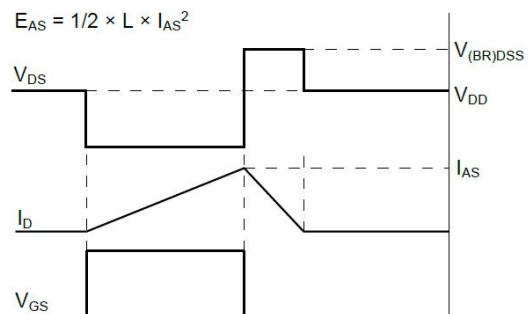
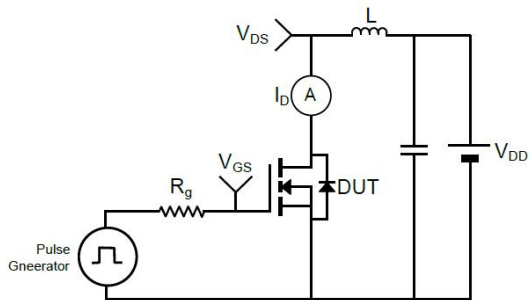
Gate Charge



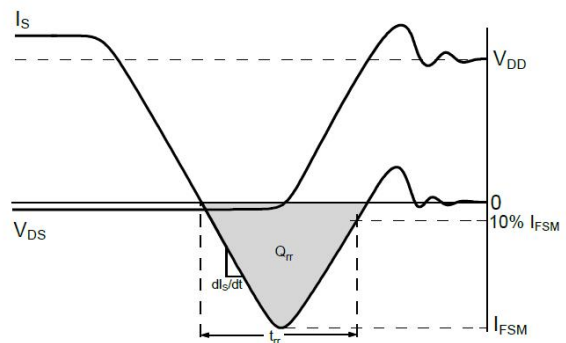
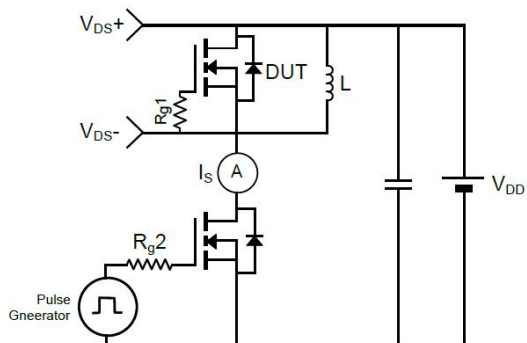
Resistive Load Switching Time



Un-clamped Inductive Load Switching

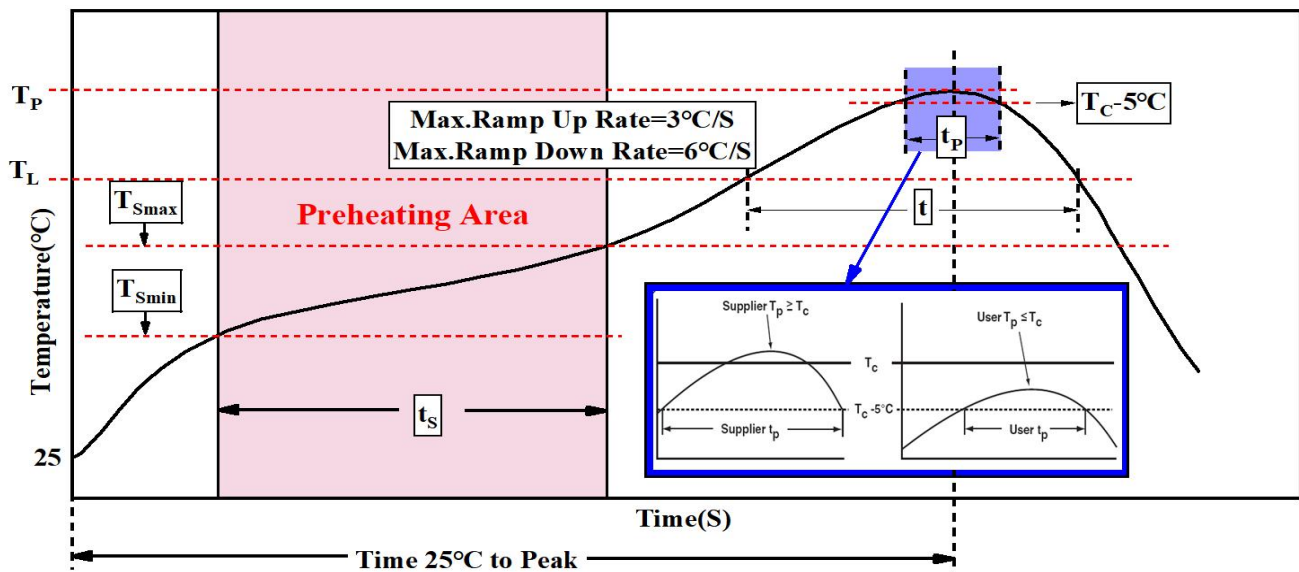


Drain-Source Body Diode Reverse Recovery





Temperature Profile for IR Reflow Soldering(Sn-Pb Eutectic&Pb-Free)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (Tsmmin)	100°C	150°C
Temperature max (Tsmmax)	150°C	200°C
Time (Tsmmin to Tsmmax) (ts)	60-120 seconds	60-120 seconds
Average ramp-up rate (Tsmmax to Tp)	3 °C/second max.	3°C/second max.
Liquidous temperature (TL)	183 °C	217°C
Time at liquidous (tL)	60-150 seconds	60-150 seconds
Peak package body Temperature e (Tp)*	See Classification Temp in table 1	See Classification Temp in table 2
Time (tp)** within 5°C of the specified classification temperature (Tc)	20** seconds	30** seconds
Average ramp-down rate (Tp to Tsmmax)	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 (Tp) is defined as a supplier minimum and a user maximum. ** Tolerance for time at peak profile temperature (tp) is defined as a supplier minimum and a user maximum		

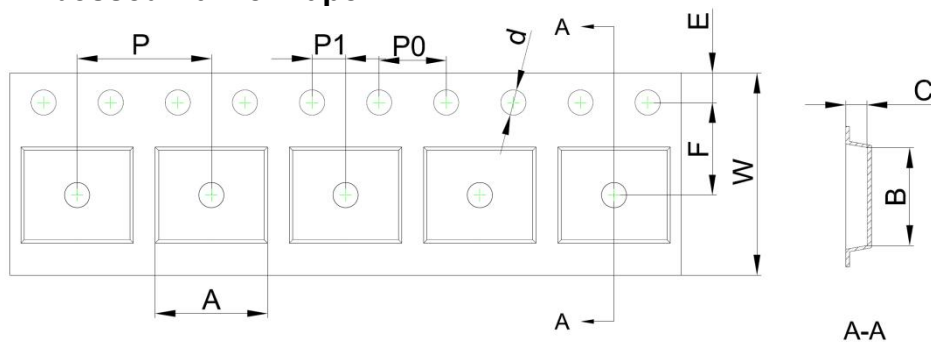
Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

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

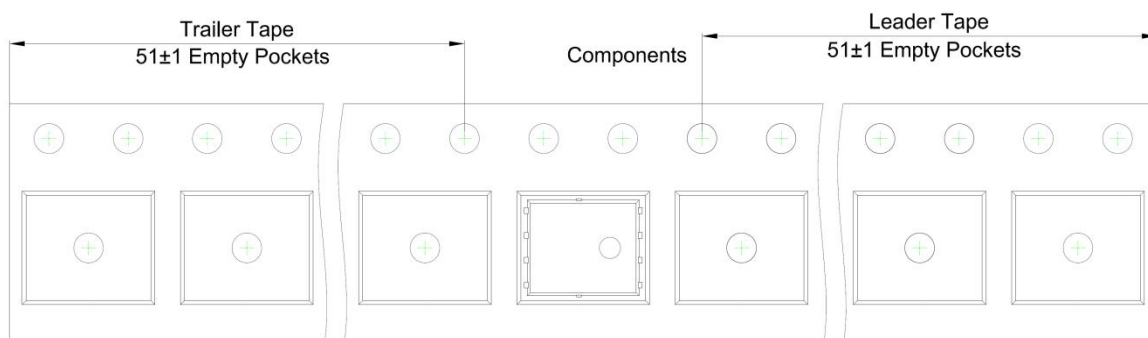
PDFN5X6-8L Embossed Carrier Tape



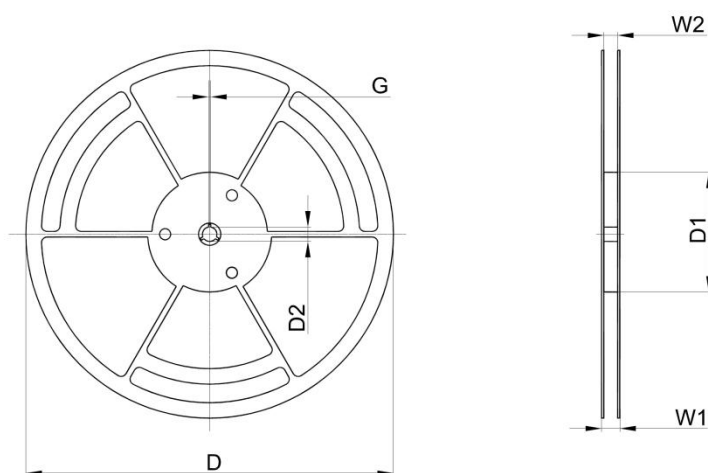
Dimensions are in millimeter

Pkg type	A	B	C	d	E	F	P0	P	P1	W
PDFN5X6-8L	6.30	5.30	1.10	Φ1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN5X6-8L Tape Leader and Trailer



PDFN5X6-8L Reel

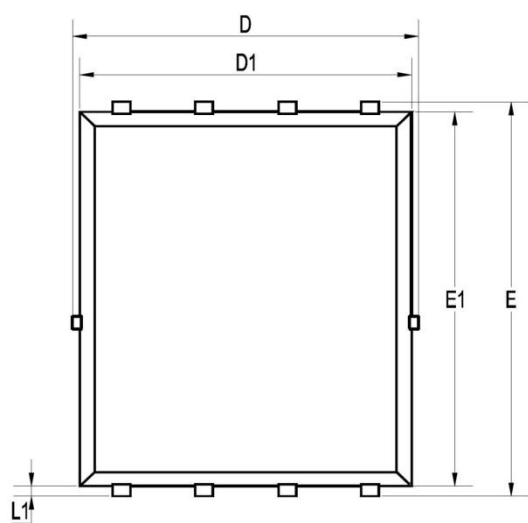


Dimensions are in millimeter

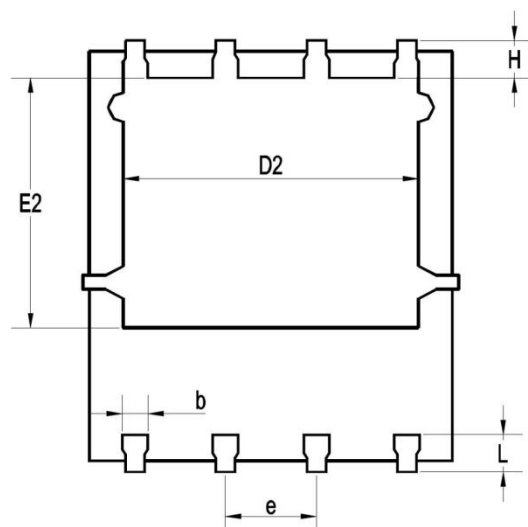
Reel Option	D	D1	D2	G	W1	W2
13"Dia	Ø330.00	100.00	13.00	1.90	17.60	12.40

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)
5,000 pcs	13 inch	5,000 pcs	340×336×29	50,000 pcs	353×346×365

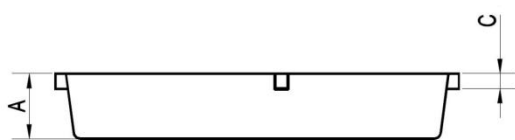
PDFN5X6-8L Package Information



Top View
[顶视图]



Bottom View
[背视图]



Side View
[侧视图]

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.120	0.035	0.044
b	0.330	0.510	0.013	0.020
C	0.110	0.340	0.004	0.013
D	4.700	5.260	0.185	0.207
D1	4.700	5.100	0.185	0.201
D2	3.560	4.500	0.140	0.177
E	5.750	6.250	0.226	0.246
E1	5.600	6.000	0.220	0.236
E2	3.180	3.660	0.125	0.144
e	1.170	1.370	0.046	0.054
L	0.350	0.710	0.014	0.028
L1	0.060	0.200	0.002	0.008
H	0.350	0.710	0.014	0.028