

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60V	10.0mΩ@10V	35A
	13.5mΩ@4.5V	



合肥矽普半导体

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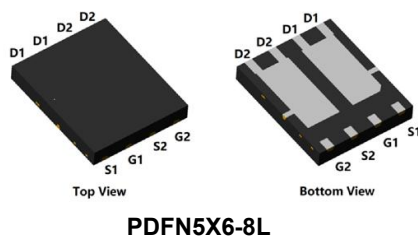
Feature

- Fast switching speed
- Surface mount package
- Advanced Split Gate Trench Technology
- **100% UIS TESTED**

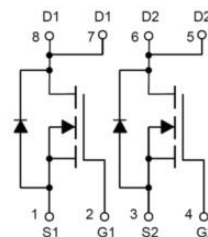
Applications

- DC-DC Converters.
- Motor Control.

Package



Circuit diagram



Marking



SP60N10GDNK :Device Code
** :Week Code

Order Information

Device	Package	Unit/Tape
SP60N10GDNK	PDFN5X6-8L	5000

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

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Tc=25°C)	I_D	35	A
Continuous Drain Current (Tc=100°C)	I_D	23	A
Pulse Drain Current Tested	I_{DM}	140	A
Single Pulse Avalanche Energy ¹	E_{AS}	121	mJ
Power Dissipation (Tc=25°C)	P_D	55	W
Power Dissipation (Tc=100°C)	P_D	22	W
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	2.27	°C/W
Maximum Junction Temperature	T_J	-55 to 150	°C
Storage Temperature Range	T_{STG}	-55 to 150	°C

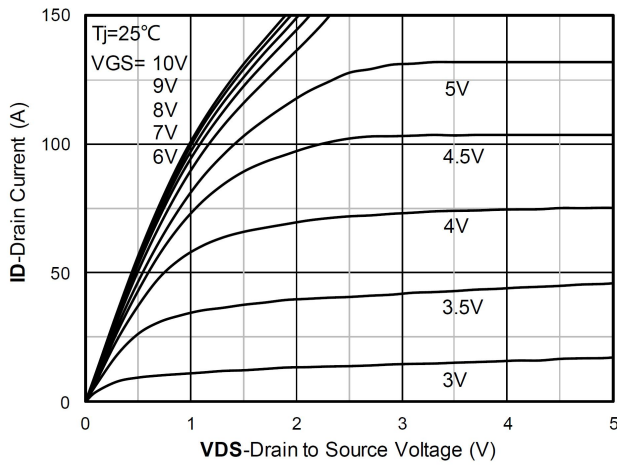
Electrical characteristics (Ta=25°C, unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , ID=250uA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =48V , V _{GS} =0V	-	-	1	uA
Gate Leakage Current	I _{GSS}	V _{GS} =±20V , V _{DS} =0V	-	-	±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , ID=250uA	1.1	1.5	2.1	V
Drain-Source On-state Resistance	R _{DS(ON)}	V _{GS} =10V , ID=15A	-	10.0	13.5	mΩ
		V _{GS} =4.5V , ID=10A	-	13.5	18.0	
Gate Resistance	R _G	f=1MHz	-	2.2	-	Ω
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V , V _{DS} =30V , f=1MHz	-	910	-	pF
Output Capacitance	C _{oss}		-	220	-	
Reverse Transfer Capacitance	C _{rss}		-	10	-	
Total Gate Charge	Q _g	V _{DS} =30V , V _{GS} =10V , ID=10A	-	13	-	nC
Gate-Source Charge	Q _{gs}		-	2.5	-	
Gate-Drain Charge	Q _{gd}		-	3.2	-	
Gate Plateau Voltage	V _{plateau}		-	3	-	V
Switching Characteristics						
Turn-On Delay Time	t _{d(on)}	V _{DD} =30V , ID=10A , V _{GS} =10V , RG=4.7Ω	-	14	-	nS
Rise Time	t _r		-	26	-	
Turn-Off Delay Time	t _{d(off)}		-	33.8	-	
Fall Time	t _f		-	26.4	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V _{SD}	V _{GS} =0V , I _S =1A , T _J =25℃	-	-	1.2	V
Maximum Body-Diode Continuous Current	I _S		-	-	35	A
Reverse Recovery Time	T _{rr}	I _S =20A , di/dt=100A/μs , T _J =25℃	-	36	-	nS
Reverse Recovery Charge	Q _{rr}		-	23	-	nC

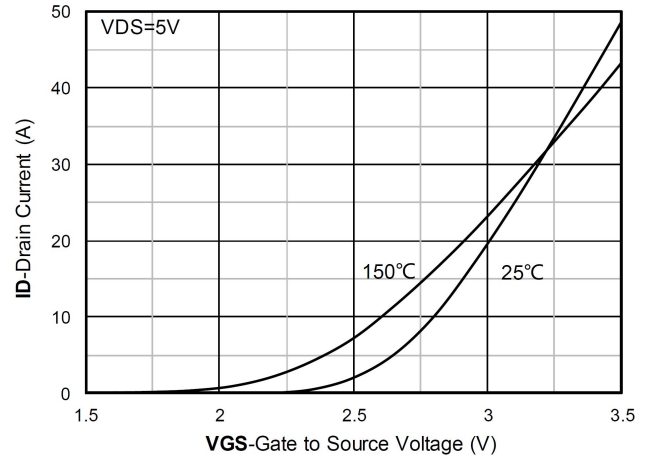
Note :

1. The test condition is $V_{DD}=30V, V_{GS}=10V, L=0.5mH, R_G=25\Omega$;

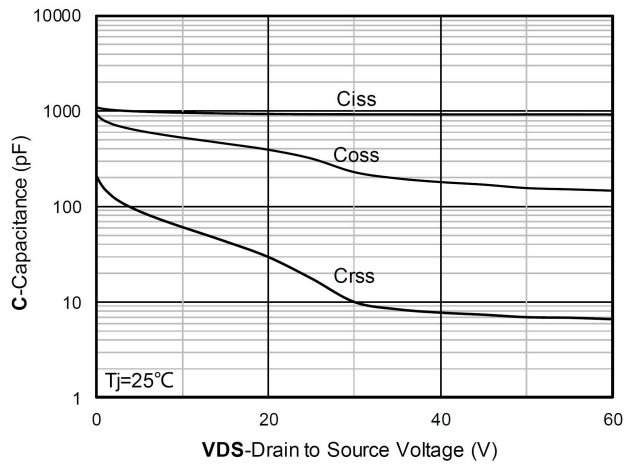
Typical Characteristics



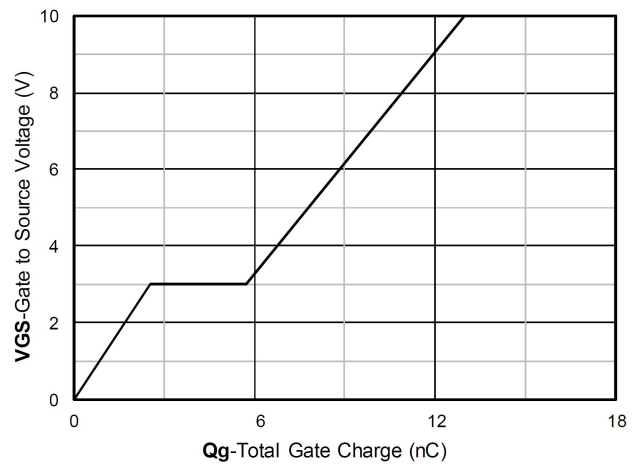
Output Characteristics



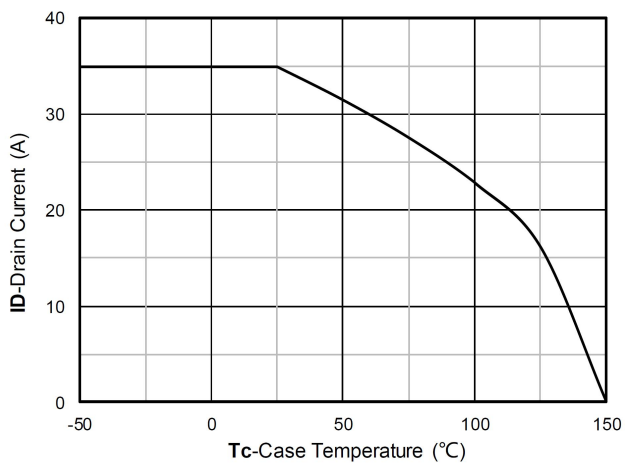
Transfer Characteristics



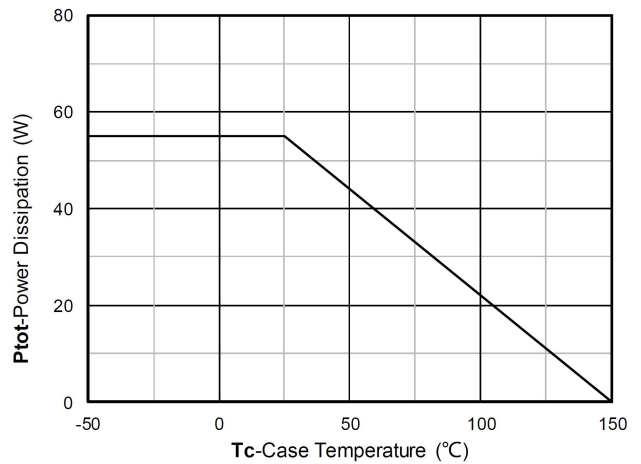
Capacitance Characteristics



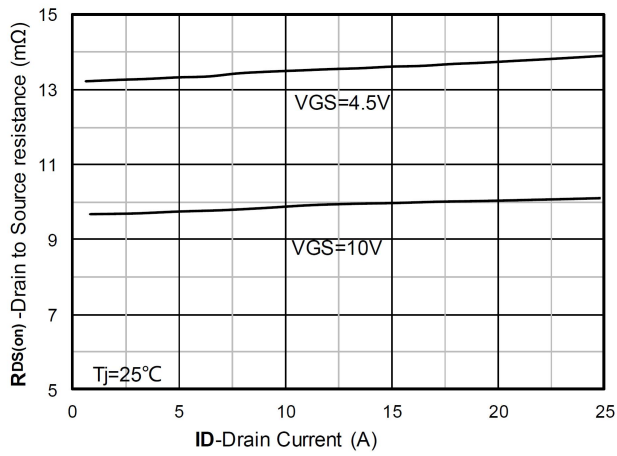
Gate Charge



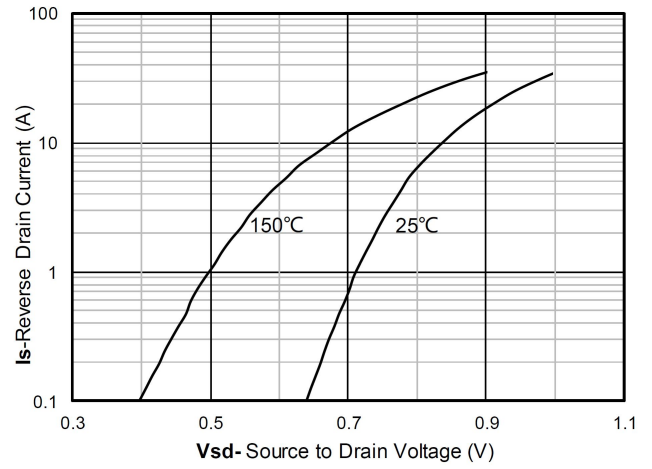
Current dissipation



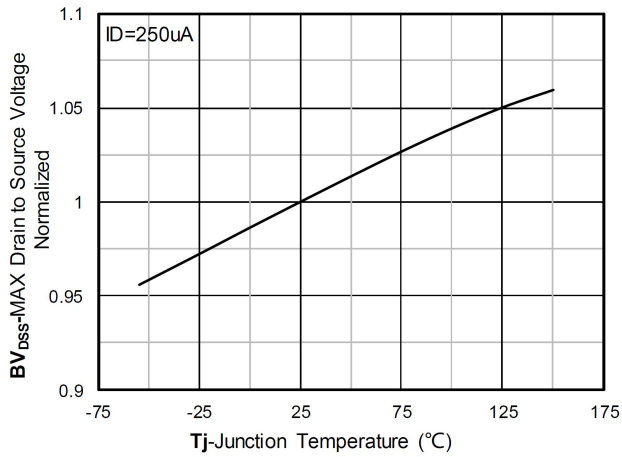
Power dissipation



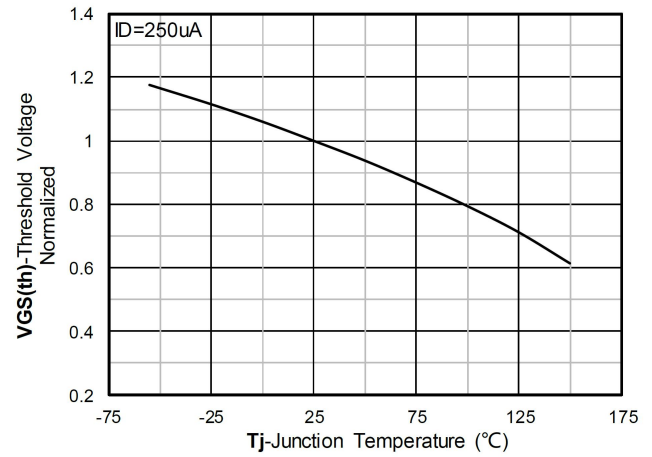
$R_{DS(on)}$ VS Drain Current



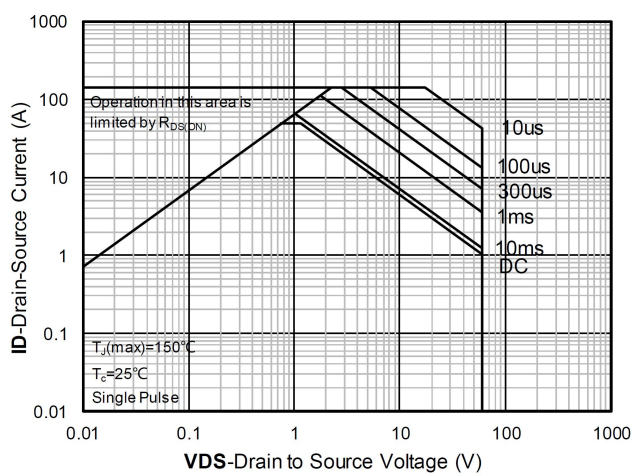
Forward characteristics of reverse diode



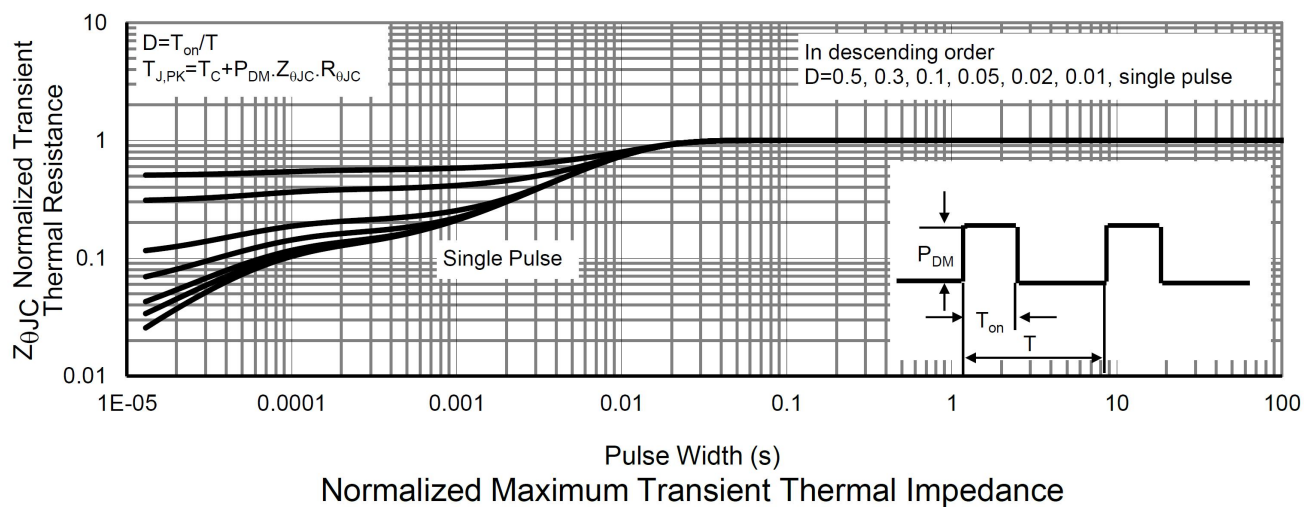
Normalized breakdown voltage



Normalized Threshold voltage

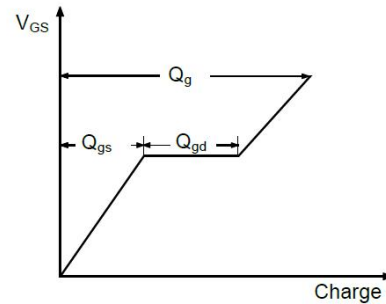
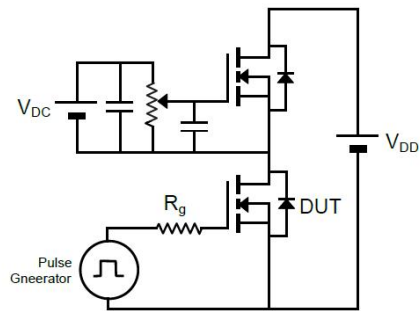


Safe Operation Area

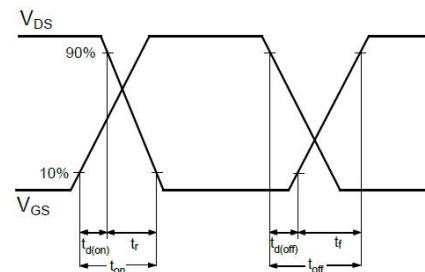
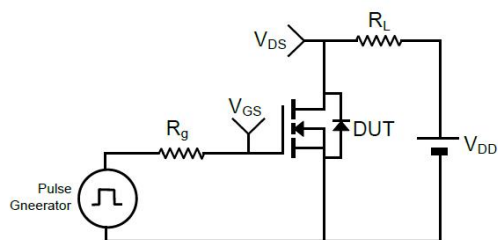


Test Circuit

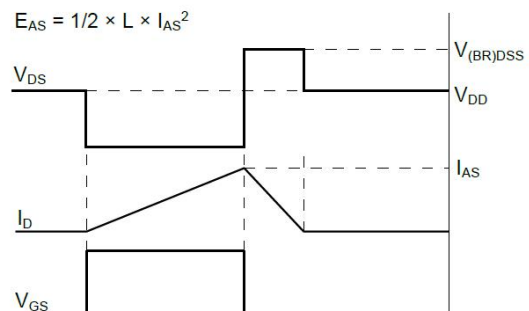
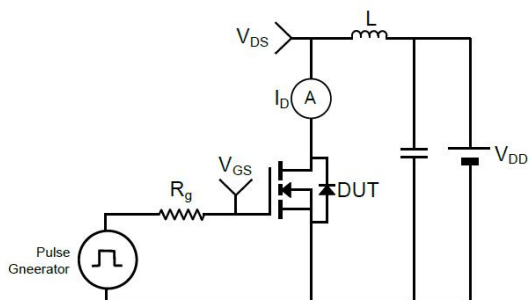
Gate Charge



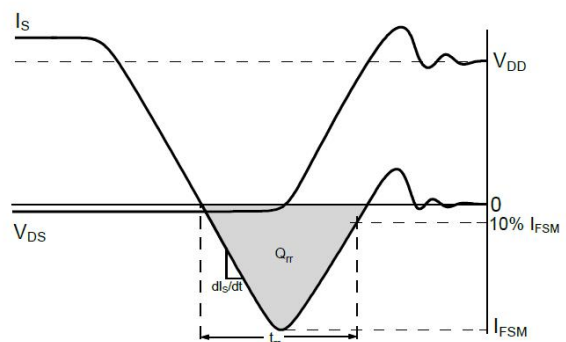
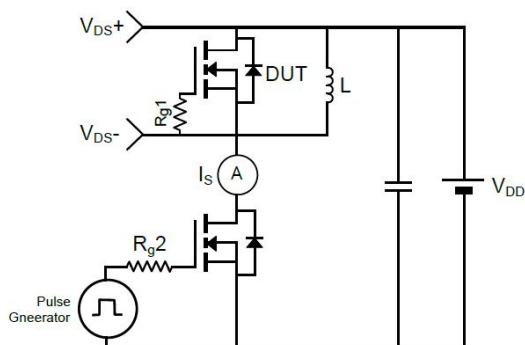
Resistive Load Switching Time



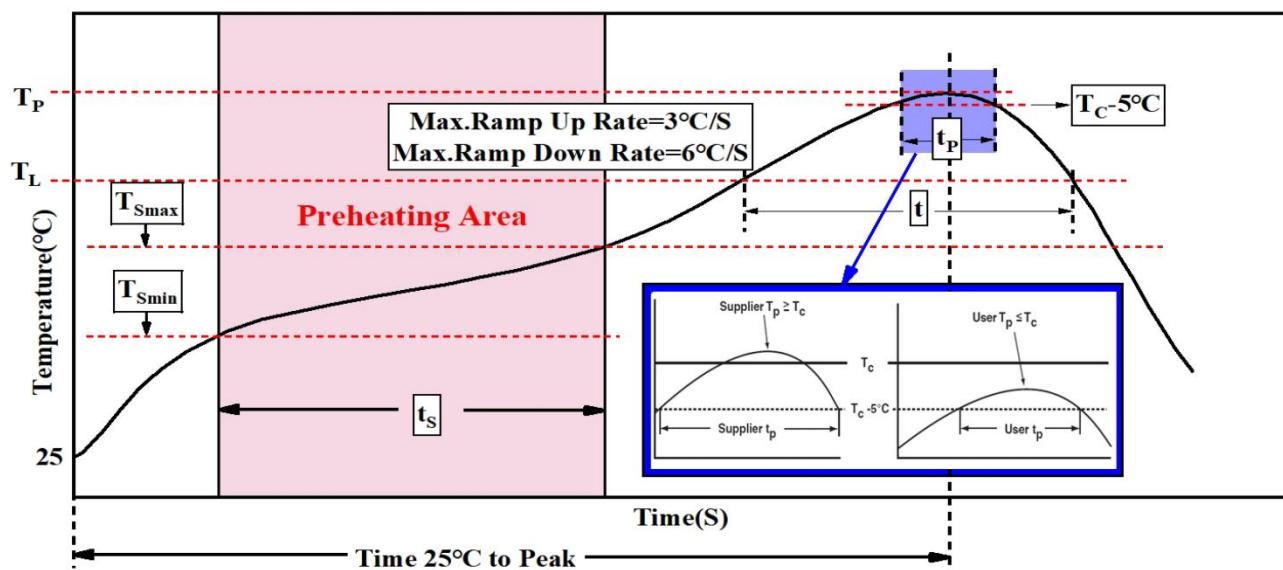
Un-clamped Inductive Load Switching



Drain-Source Body Diode Reverse Recovery



Temperature Profile for IR Reflow Soldering



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat & Soak		
Temperature min (T _{min})	100°C	150°C
Temperature max (T _{max})	150°C	200°C
Time (T _{min} to T _{max}) (t _s)	60-120 seconds	60-120 seconds
Average ramp-up rate (T _{max} 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 e (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 _{max})	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		

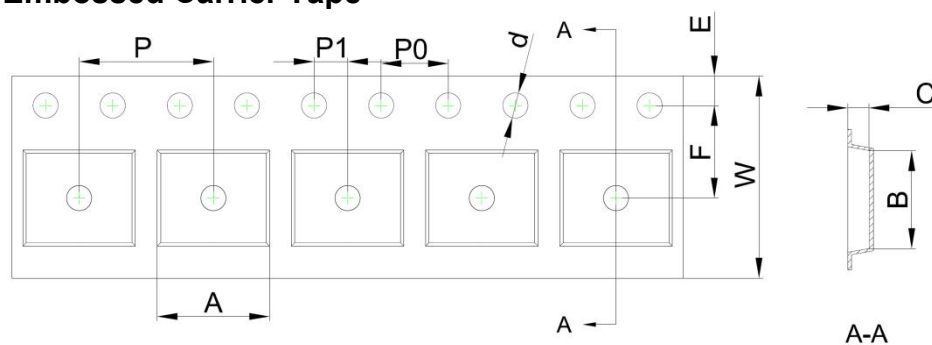
Table 1. SnPb Eutectic Process – Classification Temperatures (T_c)

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 (T_c)

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

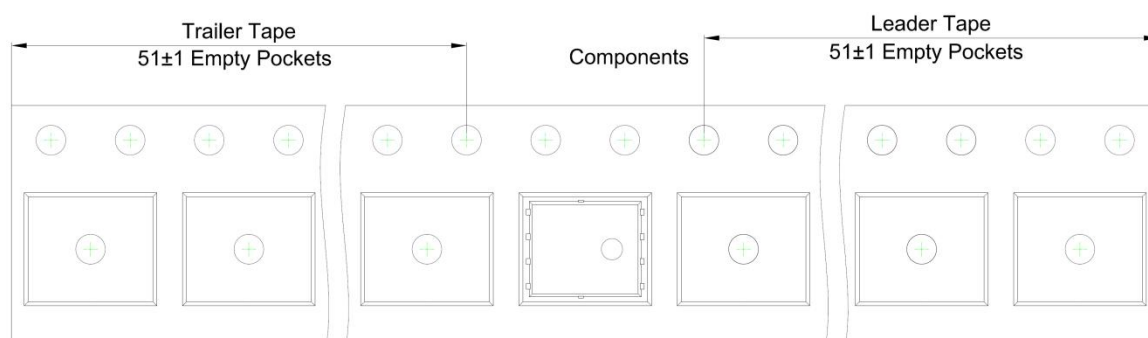
PDFN5X6-8L Embossed Carrier Tape



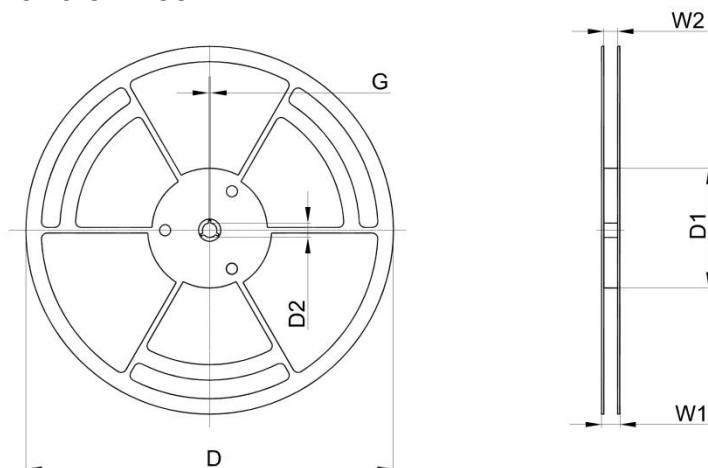
Dimensions are in millimeter

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



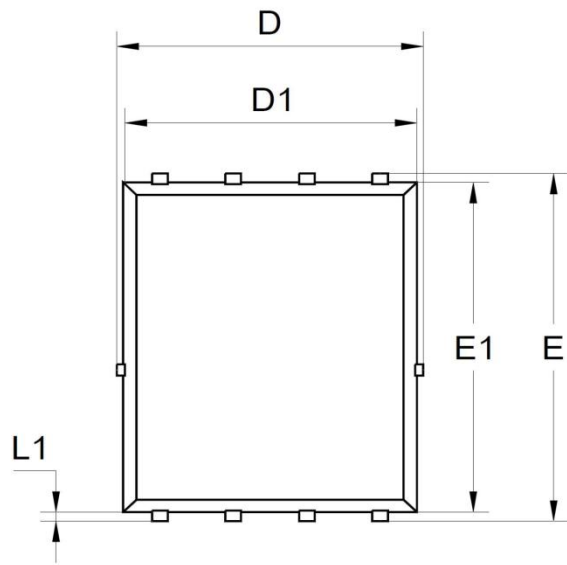
PDFN5X6-8L Reel



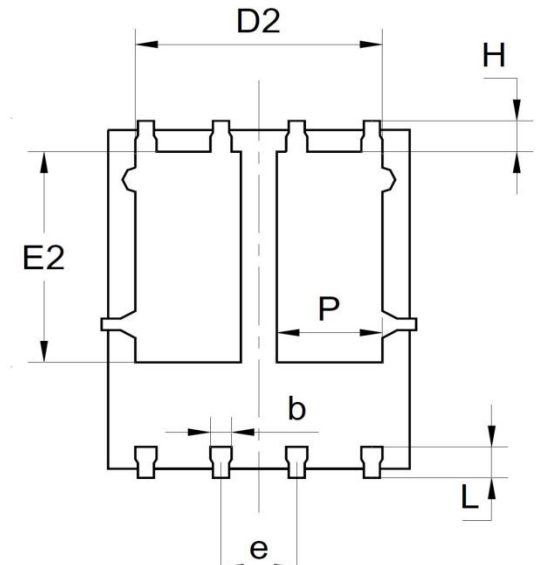
Dimensions are in millimeter

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

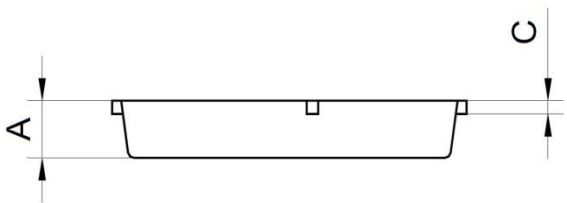
REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)
5,000 pcs	13 inch	5,000 pcs	340×336×29	50,000 pcs	353×346×365

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
P	1.700	2.300	0.067	0.091