Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
-40V	3.5mΩ@-10V	-120A
	4.8mΩ@-4.5V	

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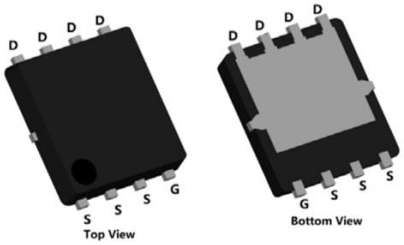
Feature

- Fast switching speed
- Surface mount package
- ROHS Compliant & Halogen-Free
- 100% Single Pulse avalanche energy Test

Applications

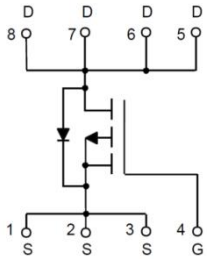
- DC-DC Converters.
- Motor Control.

Package



PDFN5X6-8L

Circuit diagram



Marking



SP40P03NK :Device Code
** :Week Code

Order Information

Device	Package	Unit/Tape
SP40P03NK	PDFN5X6-8L	5000

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

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	-40	V
Gate-Source Voltage		V_{GSS}	±20	V
Continuous Drain Current (Tc=25℃)	Package Limit	I_D	-120	A
Continuous Drain Current (Tc=25℃)	Silicon Limit	I_D	-190	A
Continuous Drain Current (Tc=100℃)		I_D	-80	A
Pulse Drain Current Tested		I_{DM}	-480	A
Single pulsed avalanche energy[1]		E_{AS}	650	mJ
Power Dissipation (Tc=25℃)		P_D	130	W
Power Dissipation (Tc=100℃)		P_D	52	W
Thermal Resistance Junction-to-Case		$R_{\theta JC}$	0.96	°C/W
Storage Temperature Range		T_{STG}	-55 to 150	°C
Operating Junction Temperature Range		T_J	-55 to 150	°C

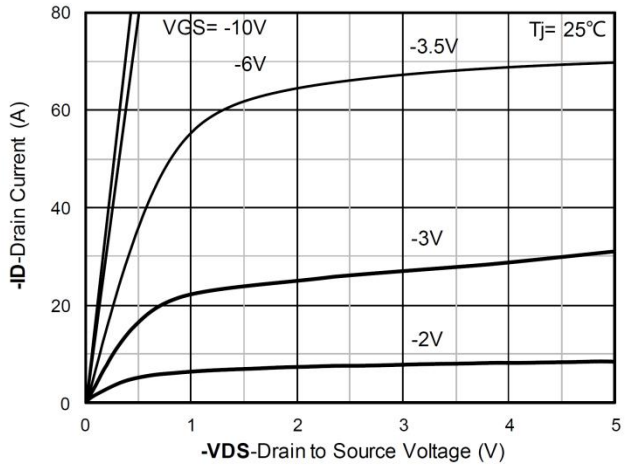
Electrical characteristics (Ta=25℃, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	VGS=0V , ID=-250uA	-40	-	-	V
Drain-Source Leakage Current	I_{DSS}	VDS=-32V , 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	-1.0	-1.6	-2.2	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	VGS=-10V , ID=-20A	-	3.5	4.4	mΩ
		VGS=-4.5V , ID=-20A	-	4.8	6.4	
Gate Resistance	R_G	VDS=-20V , VGS=0V , f=1MHz	-	1.7	-	Ω
Dynamic characteristics						
Input Capacitance	C_{iss}	VDS=-20V , VGS=0V , f=1MHz	-	10730	-	pF
Output Capacitance	C_{oss}		-	772	-	
Reverse Transfer Capacitance	C_{rss}		-	695	-	
Total Gate Charge	Q_g	VDS=-20V , VGS=-10V , ID=-20A	-	196	-	nC
Gate-Source Charge	Q_{gs}		-	24	-	
Gate-Drain Charge	Q_{gd}		-	40	-	
Gate Pleteau Vlotage	$V_{pleteau}$		-	3.1	-	V
Switching Characteristics						
Turn-On Delay Time	$T_{d(on)}$	VDD=-20V , ID=-20A , VGS=-10V , RG=3Ω	-	20	-	nS
Rise Time	T_r		-	3.5	-	
Turn-Off Delay Time	$T_{d(off)}$		-	23	-	
Fall Time	T_f		-	37	-	
Diode Characteristics						
Diode Forward Voltage	V_{SD}	VGS=0V , IS=-1A , TJ=25℃	-	-	-1.2	V
Maximum Body-Diode Continuous Current	I_S		-	-	-120	A
Reverse recover time	T_{rr}	IS=-20A , di/dt=100A/us , TJ=25℃	-	36.5	-	nS
Reverse recovery charge	Q_{rr}		-	35	-	nC

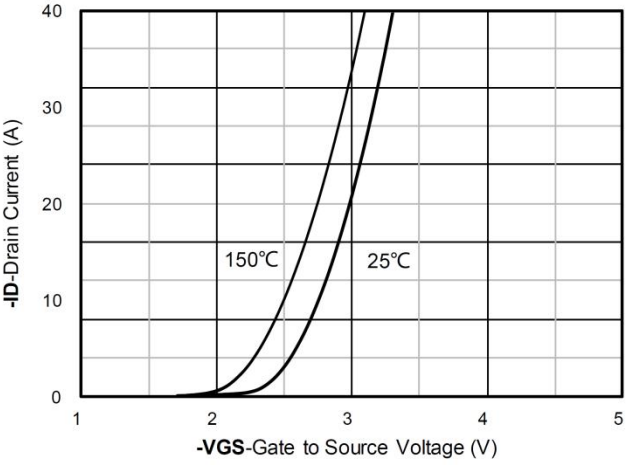
Note：

1. The EAS test condition is VDD=-20V,VGS=-10V,L=0.5mH,Rg=25Ω

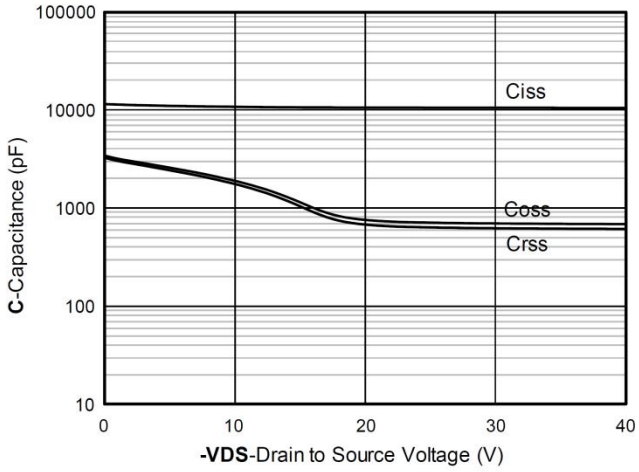
Typical Characteristics



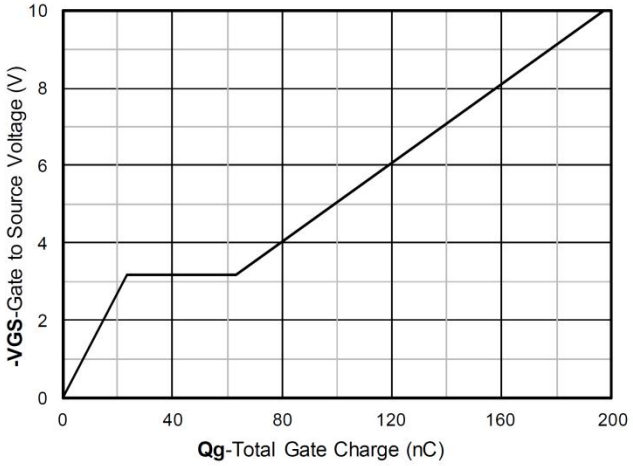
Output Characteristics



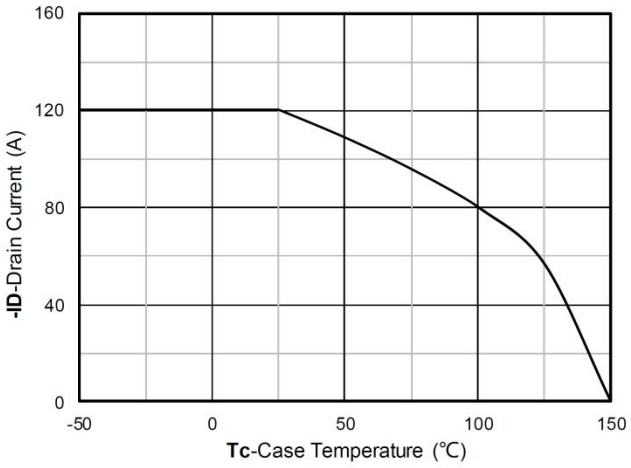
Transfer Characteristics



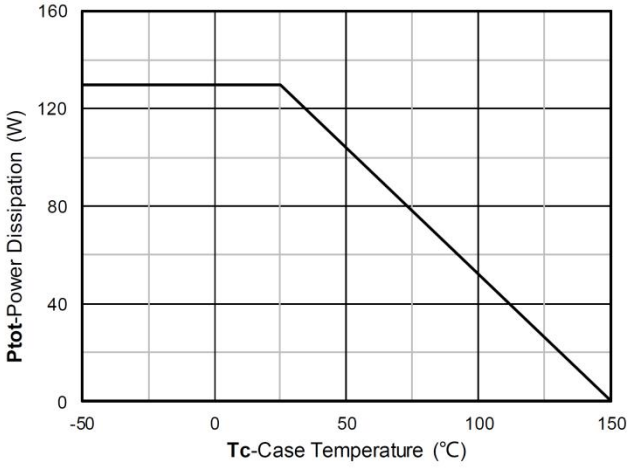
Capacitance Characteristics



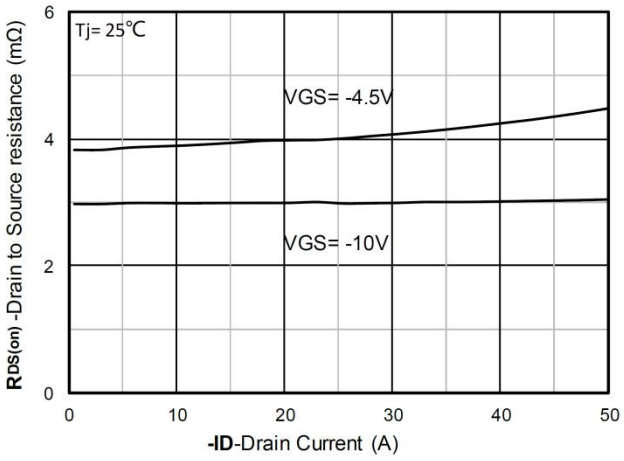
Gate Charge



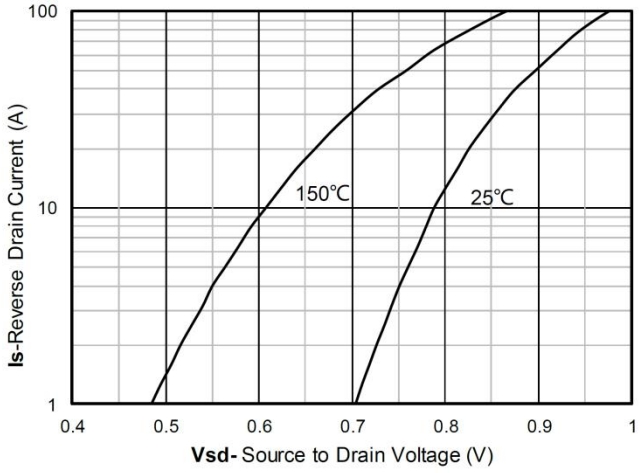
Current dissipation



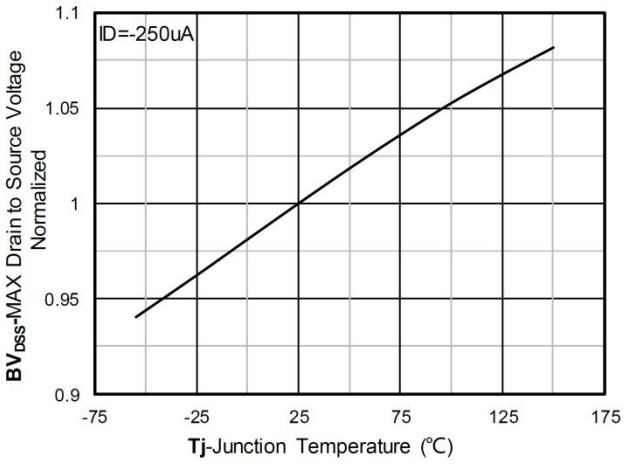
Power dissipation



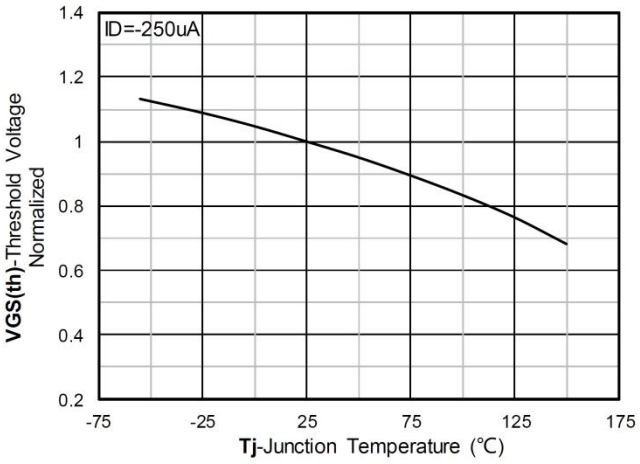
$R_{DS(on)}$ VS Drain Current



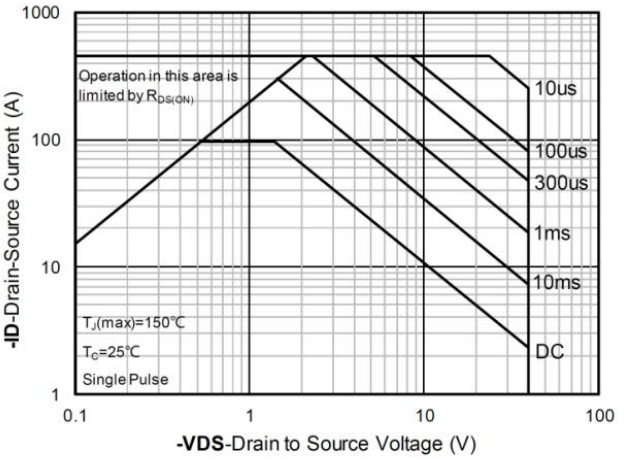
Forward characteristics of reverse diode



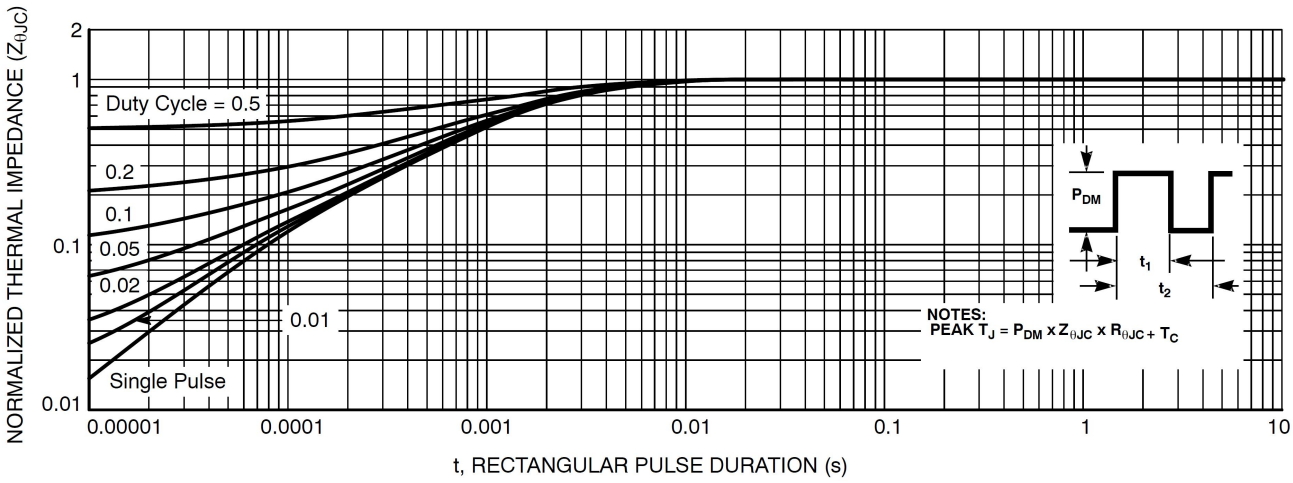
Normalized breakdown voltage



Normalized Threshold voltage



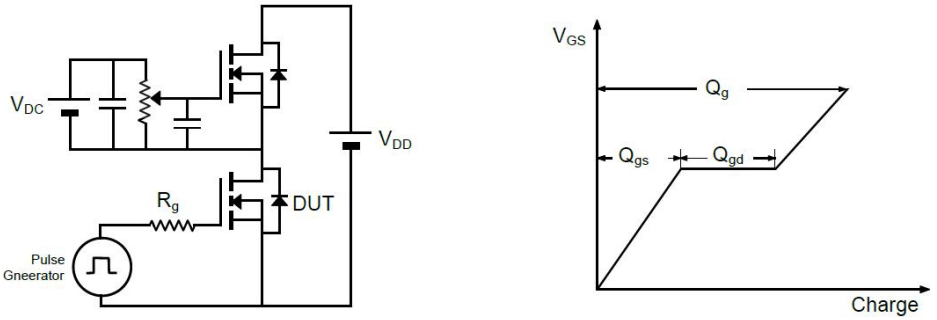
Safe Operation Area



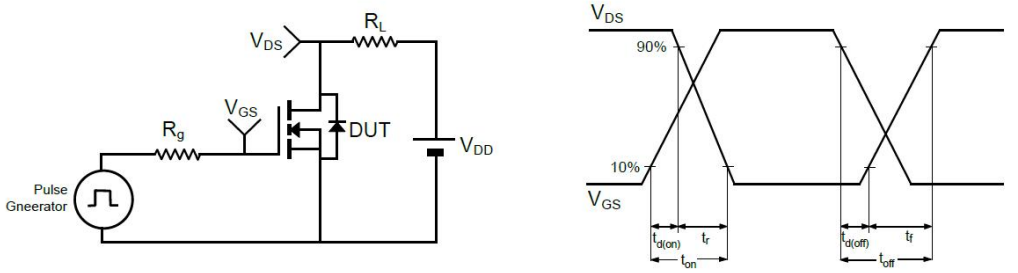
Normalized Maximum Transient Thermal Impedance

Test Circuit

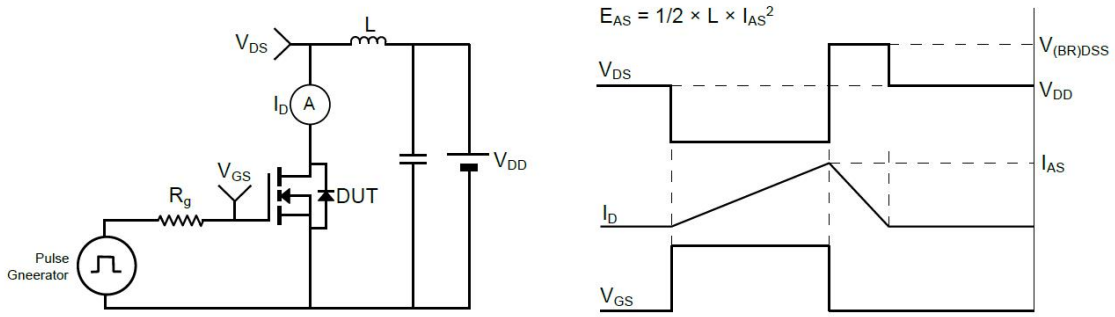
Gate Charge



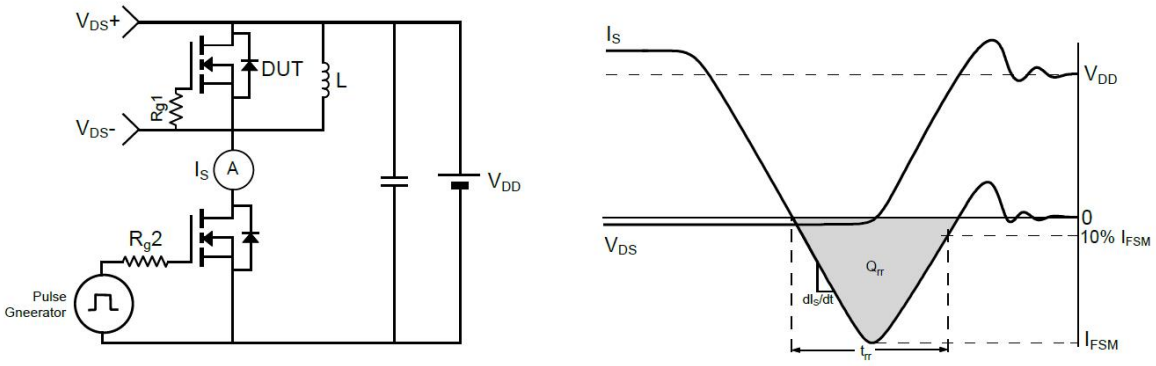
Resistive Load Switching Time



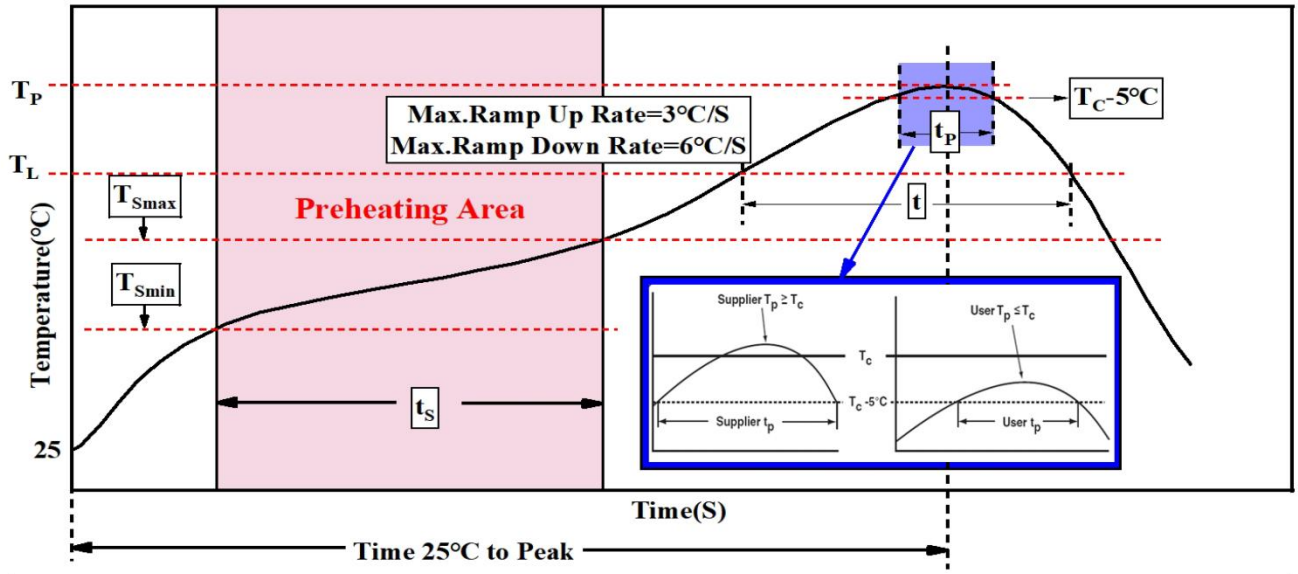
Un-clamped Inductive Load Switching



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 (Tsmin) Temperature max (Tsmax) Time (Tsmin to Tsmax) (ts)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-120 seconds
Average ramp-up rate (Tsmax to Tp)	3 °C/second max.	3°C/second max.
Liquidous temperature (TL) Time at liquidous (tL)	183 °C 60-150 seconds	217°C 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 Tsmax)	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		

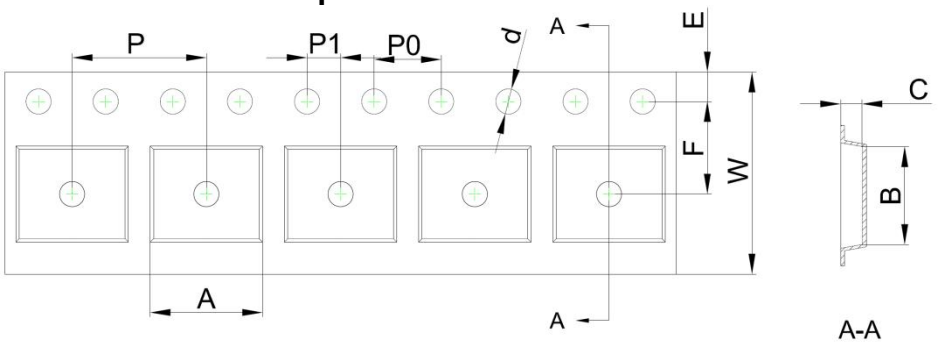
Table 1. SnPb Eutectic Process – Classification Temperatures (Tc)

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)

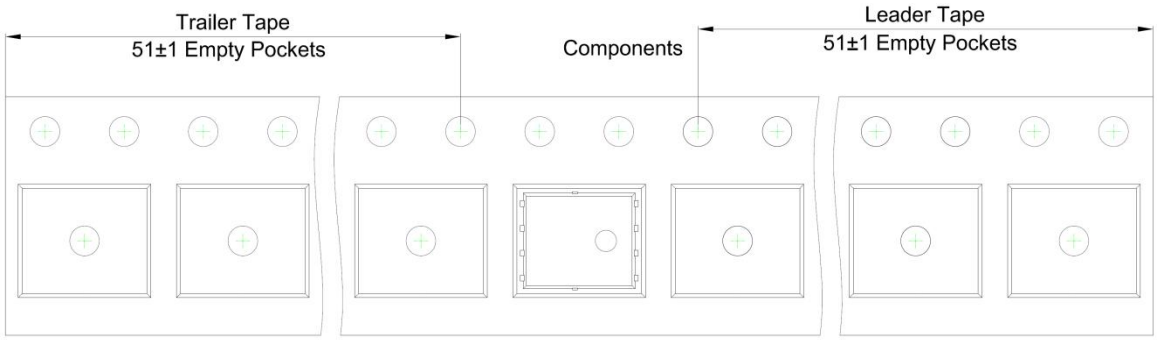
Package Thickness	Volume mm^3 <350	Volume mm^3 350-2000	Volume mm^3 >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm – 2.5 mm	260 °C	250 °C	245 °C
≥2.5 mm	250 °C	245 °C	245 °C

PDFN5X6-8L Embossed Carrier Tape

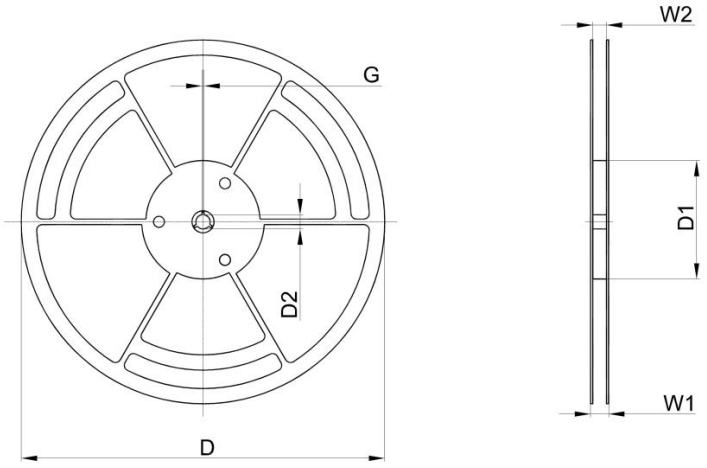


Dimensions are in millimeter										
Pkg type	A	B	C	d	E	F	P0	P	P1	W
PDFN5X6-8L	6.30	5.30	1.10	Φ1.50	1.75	5.50	4.00	8.00	2.00	12.00

PDFN5X6-8L Tape Leader and Trailer



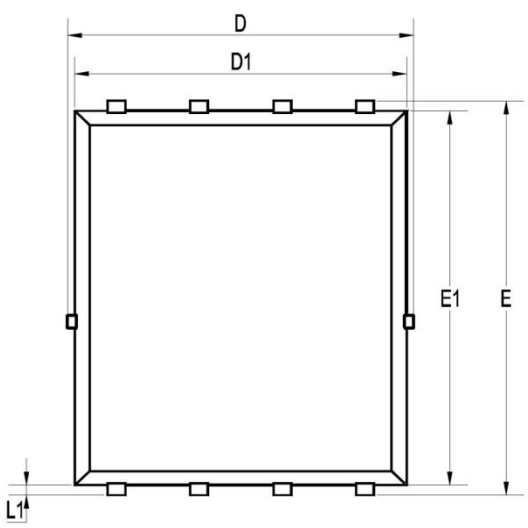
PDFN5X6-8L Reel



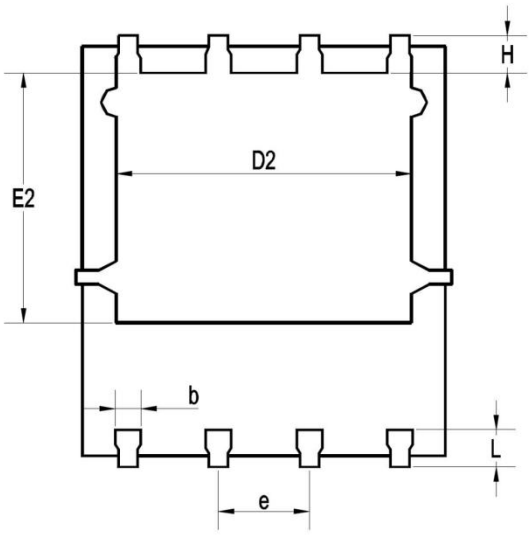
Dimensions are in millimeter						
Reel Option	D	D1	D2	G	W1	W2
13"Dia	Ø330.00	100.00	13.00	1.90	17.60	12.40

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

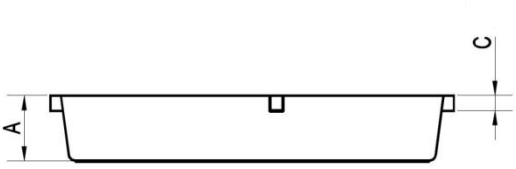
PDFN5X6-8L Package Information



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