

UN0413N1R4-PD56

ROHS

N-Channel Enhancement Mode MOSFET

Product Summary

V _{DS}	45V
I _D (@TA=25°C)	139A
R _{DS(ON)} (@V _{GS} =10V I _D =20A)	≤2.4mΩ
R _{DS(ON)} (@V _{GS} =4.5V I _D =20A)	≤3.0mΩ

Features

- ◆ Proprietary Trench Gate Device Design and Processes
- ◆ Low R_{DS(ON)}
- ◆ 100% Avalanche Tested
- ◆ Reliable and Rugged
- ◆ RoHS complian

Applications

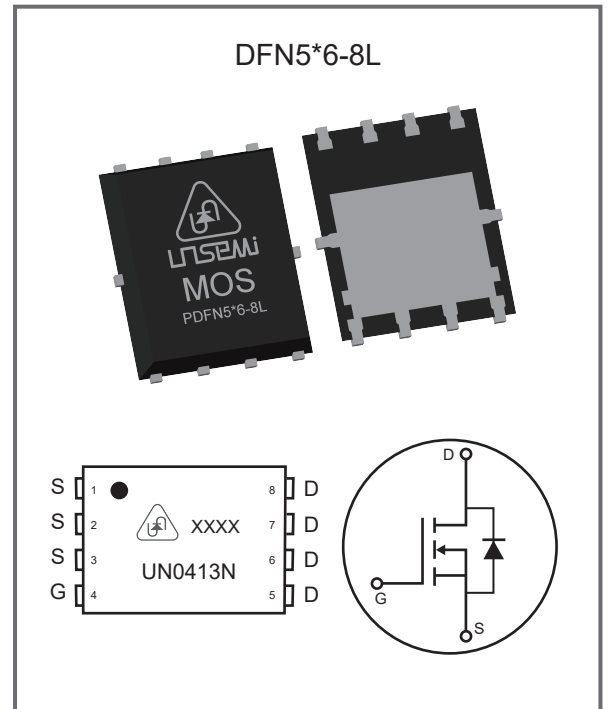
- ◆ DC/DC Converter
- ◆ Battery Management System
- ◆ Industrial and Motor Drive applications
- ◆ Synchronous rectifier applications
- ◆ Half-bridge and full-bridge topologies

Package Marking And Ordering information

Part Number	Package Type	Packaging	Reel(pcs)
UN0413N1R4-PD56	DFN5*6-8L	Tape & Reel	5,000



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Absolute Maximum Ratings TC = 25°C unless otherwise specified

Parameter		Symbol	Maximum	Units
Drain to Source Voltage		VDs	45	V
Continuous Drain Current ¹⁾	@TC=25°C	ID	139	A
	@TC=100°C		88	
Drain Current Pulsed ²⁾		IDM	417	A
Gate-Source Voltage		VGS	±20	V
Single Pulsed Avalanche Energy ³⁾		EAS	467	mJ
Power Dissipation	@TC=25°C	PD	83	W
	@TC=100°C		33	
Junction and Storage Temperature Range		Tstg,TJ	-55~150	°C

Thermal Characteristics

Parameter	Symbol	Tay	Max	Units
Thermal Resistance from Junction to Ambient	RθJA	--	60	°C/W
Thermal Resistance, Junction to Case	RθJC	--	1.5	°C/W

Notes:

- 1) The maximum current rating is silicon wafer limited.
- 2) Single pulse width limited by junction temperature .
- 3) Limited by TJ(MAX), Starting at TJ=25°C, Rg=25Ω, L=0.5mH.
- 4) Design parameters,Guaranteed by design, not subject to production.

Electrical Characteristics at Tc = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BVDSS	VGS = 0V, ID = 250uA	45			V
Drain-Source Leakage Current	IDSS	VDS = 45V, VGS = 0V			1.0	μA
Gate-source leakage current	IGSS	VGS = ±20V, VDS = 0V			±100	nA
Gate-Source Threshold Voltage	VGS(TH)	VGS = VDS, ID = 250μA	1.0	-	2.5	V
Drain-Source On-State Resistance	RDS(ON)	VGS = 10V, ID = 20A		1.4	2.4	mΩ
		VGS = 4.5V, ID = 20A		1.8	3.0	mΩ
Forward Transconductance(GMP)	GFS	VDS = 5.0V, ID = 30A		64		S
Body-Diode PARAMETERS						
Drain-Source Diode Forward Voltage	VSD	IS = 1A, VGS = 0V		0.7	1.1	V
Body Diode Reverse Recovery Time	trr	IF = 20A di/dt = 100A/μs		49		ns
Body Diode Reverse Recovery Charge	Qrr			71		nC
DYNAMIC PARAMETERS ⁴⁾						
Gate Resistance	Rg	F = 1MHZ		1.3		Ω
Input Capacitance	Ciss	VGS = 0V VDS = 20V F = 1MHZ		8358		pF
Output Capacitance	Coss			1128		pF
Reverse Transfer Capacitance	Crss			1092		pF
Gate charge Total	Qg	VGS = 10V VDS = 20V ID = 20A		110		nC
Gate to Source Charge	Qgs			31.4		nC
Gate to Drain Charge	Qgd			33.5		nC
SWITCHING PARAMETERS ⁴⁾						
Turn-On Delay Time	td(ON)	VDS = 20V, VGS = 10V Rg = 1.5Ω		21.4		ns
Turn-On Rise Time	tr			28.3		ns
Turn-Off Delay Time	td(OFF)			66.9		ns
Turn-Off Fall Time	tf			36.1		ns

Electrical Characteristics Curves

Fig. 1 Power Derating

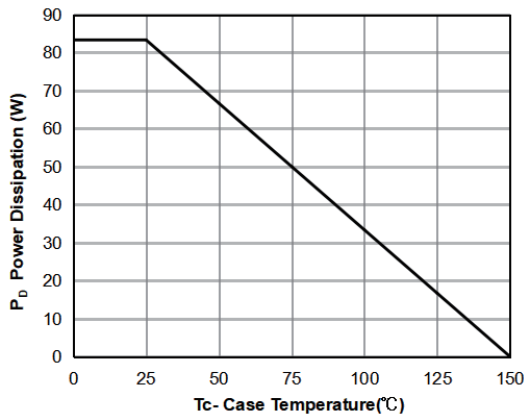


Fig. 2 Maximum Drain Current vs. Case Temperature

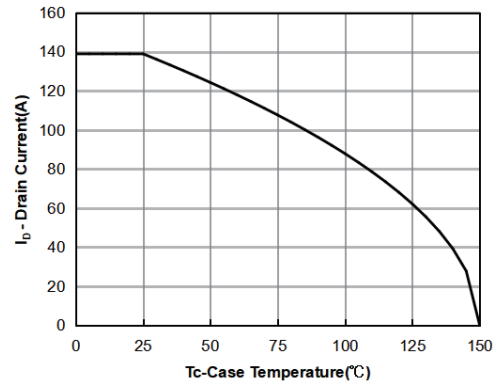


Fig. 3 Output Characteristics

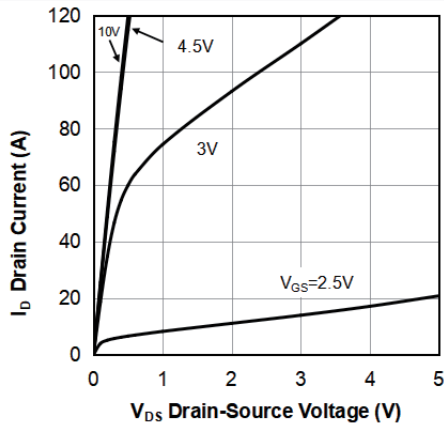


Fig. 4 Transfer Characteristics

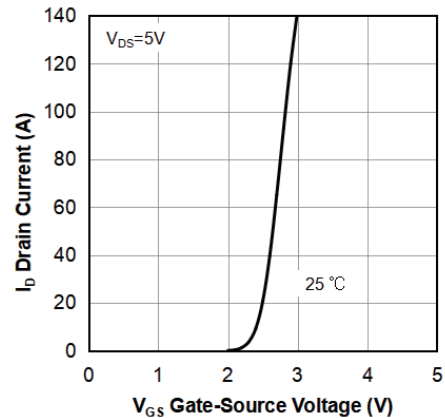


Fig. 5 On-Resistance vs. Drain Current and Gate Voltage

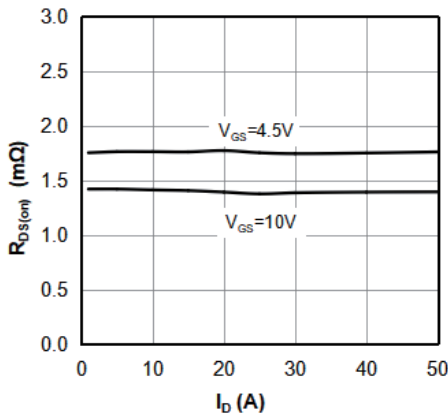
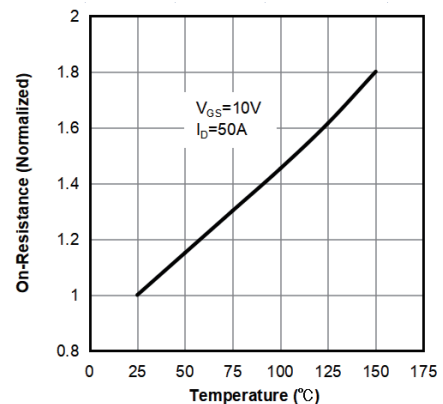


Fig. 6 On-Resistance vs. Junction Temperature/ Normalized On-Resistance



Electrical Characteristics Curves

Fig. 7 On-Resistance vs. Gate-Source Voltage

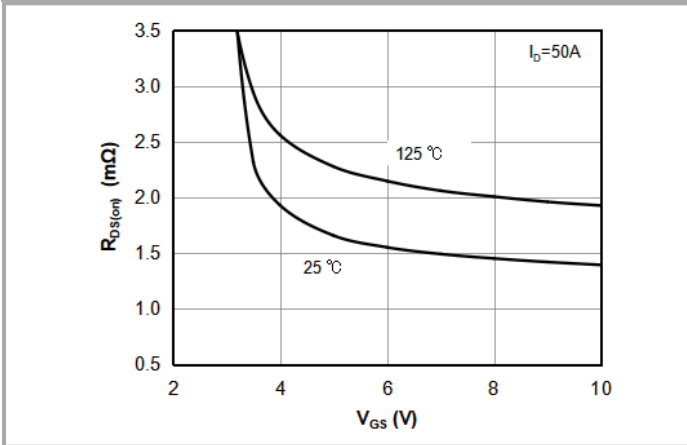


Fig. 8 Body-Diode Characteristics

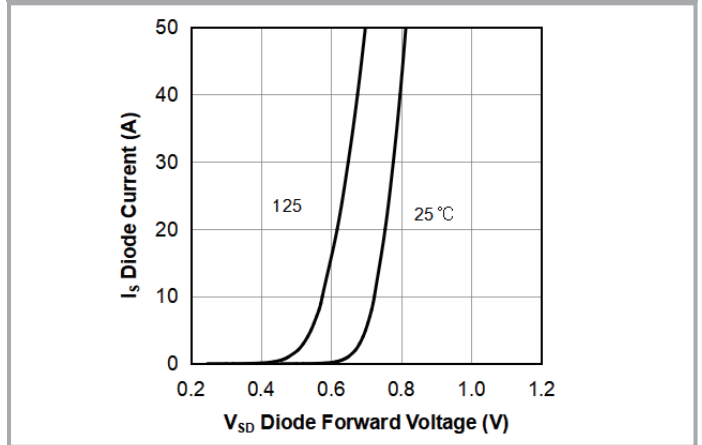


Fig. 9 Capacitance Characteristics

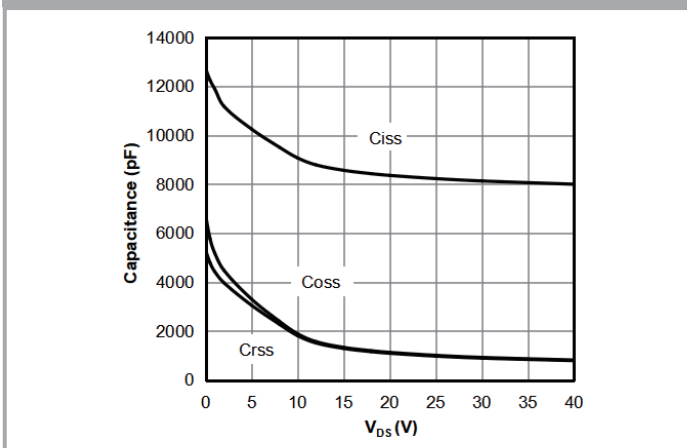


Fig. 10 Gate Charge Characteristics

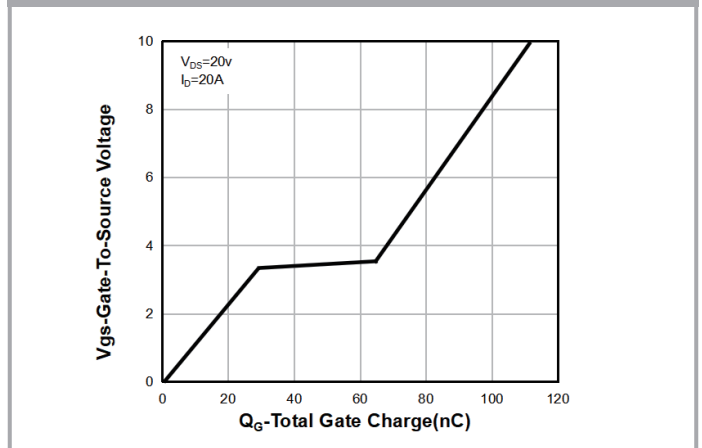
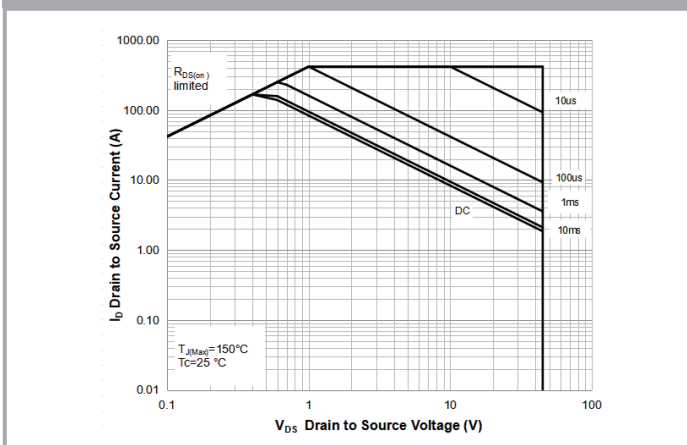
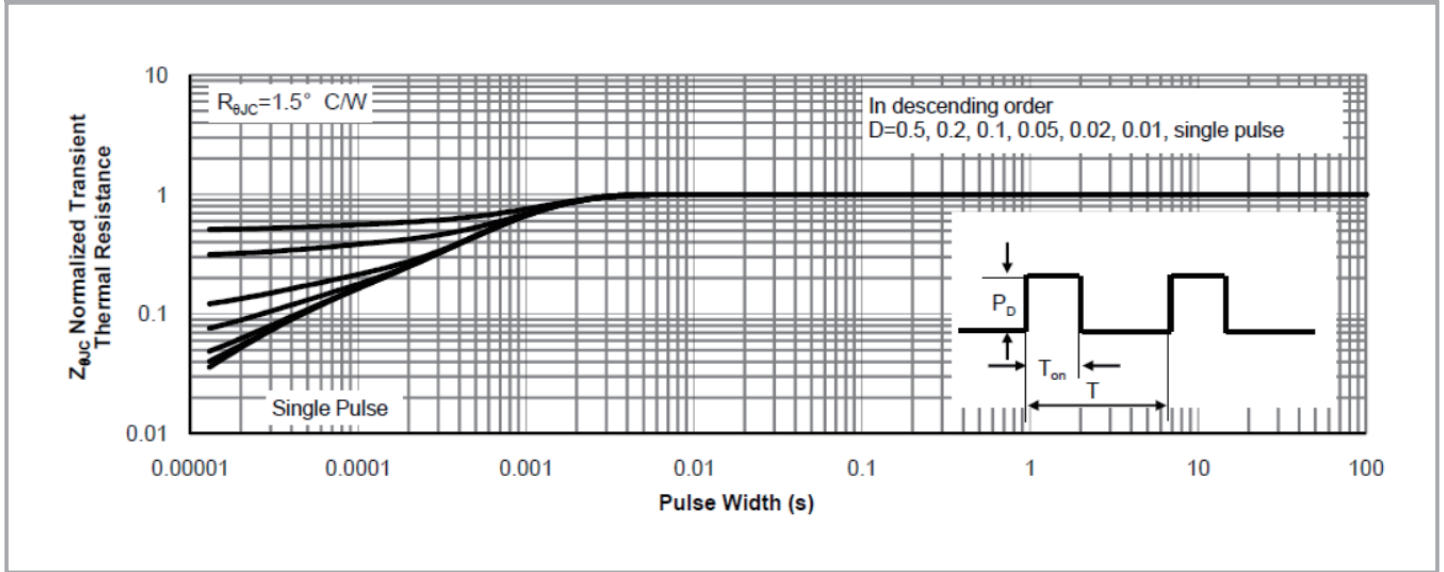


Fig. 11 Safe Operation Area

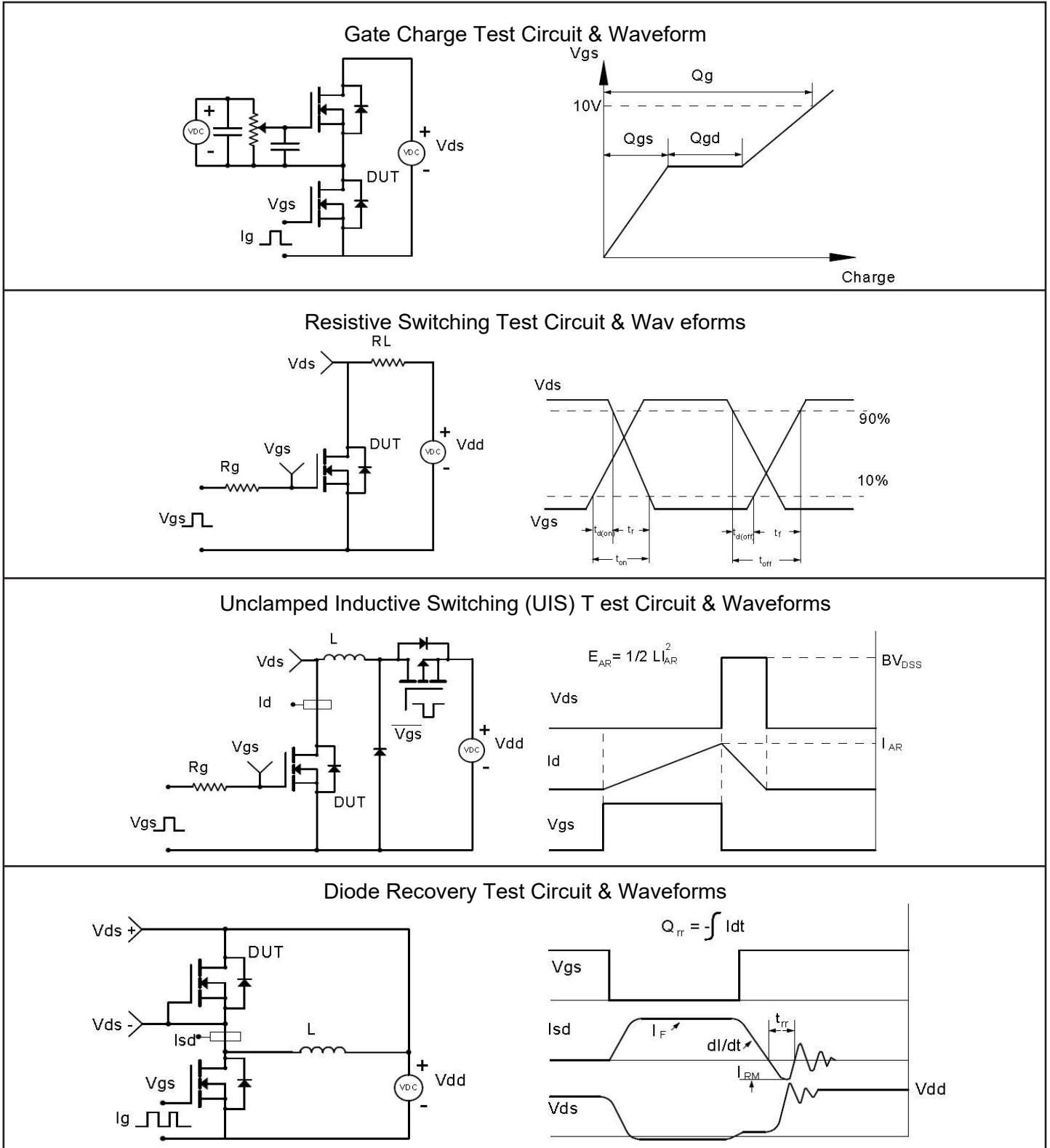


Electrical Characteristics Curves

Fig. 12 Normalized Maximum Transient thermal impedance

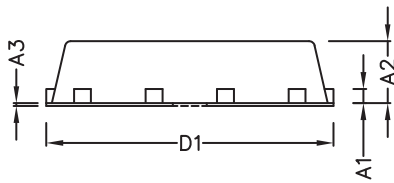


Test Circuit

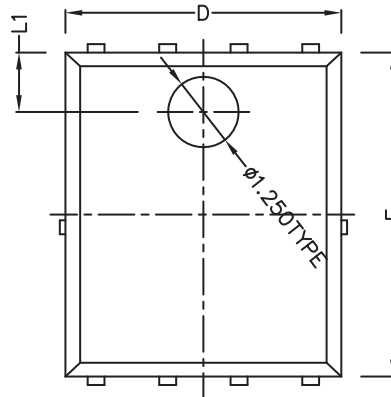


DFN5*6-8L Package Outline & Dimensions (Units: mm / in)

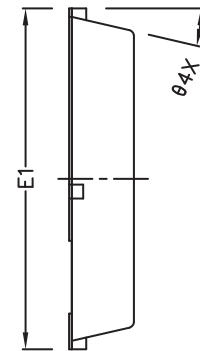
PDFN5*6-8L



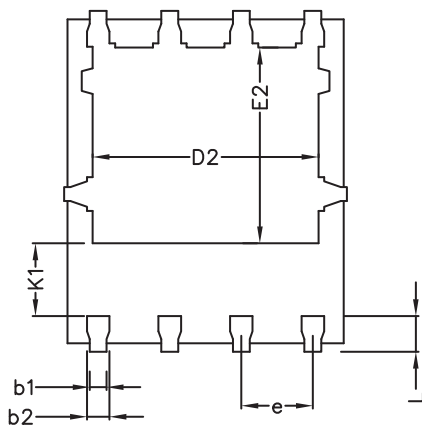
SIDE VIEW



TOP VIEW



SIDE VIEW



BOTTOM VIEW
OPTION 1

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A1	(0.254 BSC)		(0.0100 BSC)	
A2	1.000	1.100	0.0394	0.0433
A3	0.005	-	0.0001	-
b1	0.250	0.300	0.0098	0.0118
b2	0.350	0.400	0.0138	0.0157
D	4.800	4.900	0.1890	0.1929
D1	5.000	5.100	0.1969	0.2008
D2	3.910	4.010	0.1539	0.1579
E	5.650	5.750	0.2224	0.2263
E1	5.950	6.050	0.2342	0.2381
E2	3.375	3.475	0.1329	0.1368
e	(1.270 TYPE)		(0.0500 TYPE)	
L	0.530	0.630	0.0209	0.0248
L1	1.00 REF		0.0394 REF	
θ	13° TYPE		13° TYPE	
K1	1.235 REF		0.0486 REF	

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