UN0405N2R4-PD56

ROHS

N-Channel Enhancement Mode MOSFET

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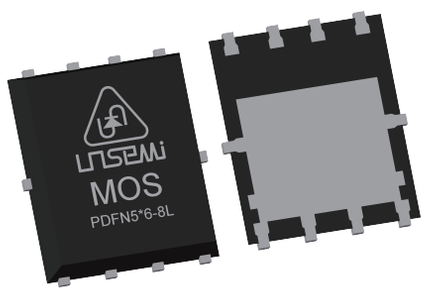
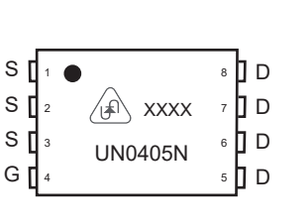
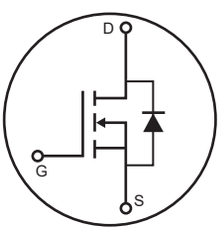
Product Summary

V_{DS}	40V
I_D(@TC=25℃)	59A
$R_{DS(ON)}$(@V_{GS}=10V I_D=20A)	≤4.0mΩ
$R_{DS(ON)}$(@V_{GS}=4.5V I_D=20A)	≤5.2mΩ

DFN5*6-8L







Features

- ◆ Proprietary Trench Gate Device Design and Processes
- ◆ 100% Avalanche Tested
- ◆ Reliable and Rugged
- ◆ RoHS complian

Applications

- ◆ DC/DC Converter
- ◆ Battery Management System
- ◆ High power inverter system
- ◆ Industrial and Motor Drive applications

Package Marking And Ordering information

Part Number	Package Type	Packaging	Reel(pcs)
UN0405N2R4-PD56	DFN5*6-8L	Tape & Reel	5,000

Absolute Maximum Ratings Tc = 25℃ unless otherwise specified

Parameter		Symbol	Maximum	Units
Drain to Source Voltage		V_{DS}	40	V
Continuous Drain Current [1]	@Tc=25℃	I_D	59	A
	@Tc=100℃		48	
Drain Current Pulsed [2]		I_{DM}	236	A
Drain current of silicon wafer [3]		I_{DSW}	94	A
Gate-Source Voltage		V_{GS}	±20	V
Single Pulsed Avalanche Energy [4]		E_{AS}	130	mJ
Power Dissipation	@Tc=25℃	P_D	62.5	W
	@Tc=100℃		25	
Junction and Storage Temperature Range		Tstg,T_J	-55~150	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Thermal Resistance from Junction to Ambient	$R_{\theta JA}$	--	63	℃/W
Thermal Resistance, Junction to Case	$R_{\theta JC}$	--	2.0	℃/W

Notes:

1) The maximum current rating is package limited.
2) Single pulse width limited by junction temperature .
3) The maximum current rating is silicon wafer limited.
4) Limited by $T_{J(MAX)}$, starting T_J=25℃, Rg=25Ω, L=0.5mH.
5) Design parameters, guaranteed by design, not subject to production.

Electrical Characteristics at Tc = 25℃ unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} = 0V, I_D = 250uA	40			V
Drain-Source Leakage Current	I_{DSS}	V_{DS} = 40V , V_{GS} = 0V			1.0	μA
Gate-source leakage current	I_{GSS}	V_{GS} = ±20V , V_{DS} = 0V			±100	nA
Gate-Source Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS} , I_D = 250μA	1.0	2.0	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS} = 10V , I_D = 20A		2.4	4.0	mΩ
		V_{GS} = 4.5V , I_D = 20A		4.0	5.2	mΩ
Forward Transconductance	gfs	V_{DS} = 5.0V, I_D = 20A		23		S
Body-Diode PARAMETERS						
Drain-Source Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V		0.7	1.1	V
Body Diode Reverse Recovery Time	trr	I_F = 20A di/dt = 100A/μs		31.5		ns
Body Diode Reverse Recovery Charge	Qrr			19.2		nC
DYNAMIC PARAMETERS [5]						
Gate Resistance	R_G	F = 1MHz		1.5		Ω
Input Capacitance	Ciss	V_{GS} = 0V V_{DS} = 20V F = 1MHz		2488		pF
Output Capacitance	Coss			463		pF
Reverse Transfer Capacitance	Crss			448		pF
Gate charge Total	Qg	V_{GS} = 10V V_{DS} = 20V I_D = 20A		65		nC
Gate to Source Charge	Qgs			16.3		nC
Gate to Drain Charge	Qgd			13.8		nC
SWITCHING PARAMETERS [5]						
Turn-On Delay Time	$td_{(ON)}$	V_{DS} = 20V, V_{GS} = 10V R_G = 2.7Ω		10.8		ns
Turn-On Rise Time	tr			11.2		ns
Turn-Off Delay Time	$td_{(OFF)}$			37.4		ns
Turn-Off Fall Time	tf			15.7		ns

Electrical Characteristics Curves

Fig. 1 Power Derating

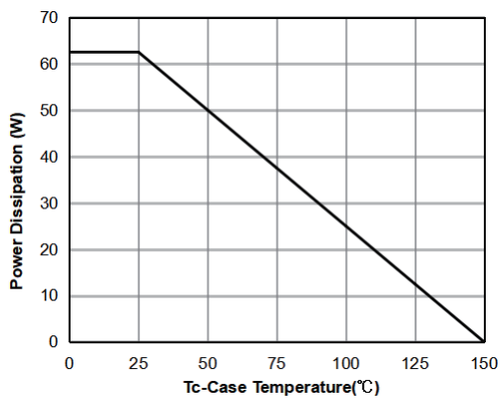


Fig. 2 Maximum Drain Current vs. Case Temperature

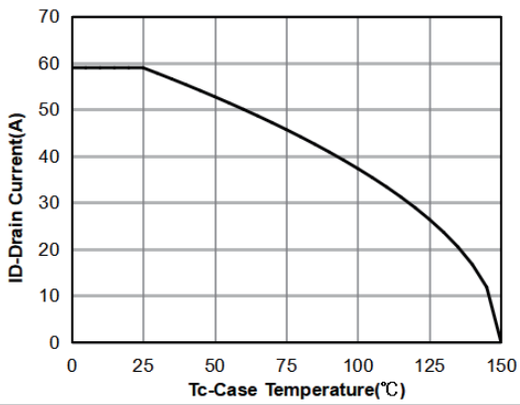


Fig. 3 Output Characteristics

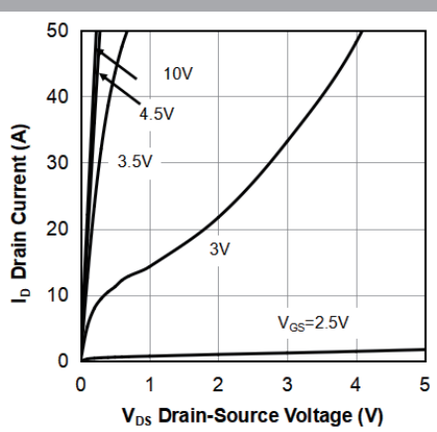


Fig. 4 Transfer Characteristics

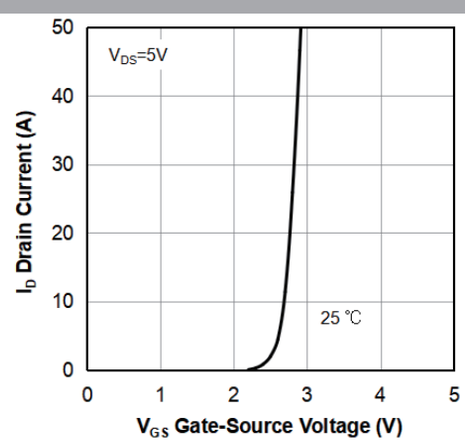


Fig. 5 On-Resistance vs. Drain Current and Gate Voltage

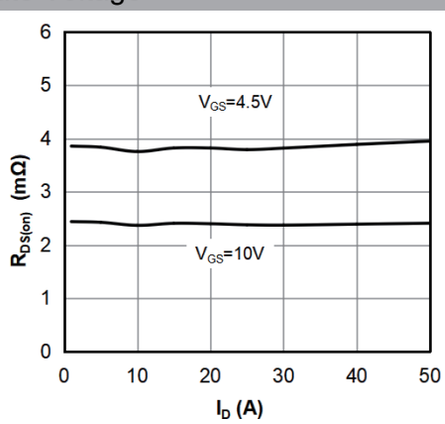
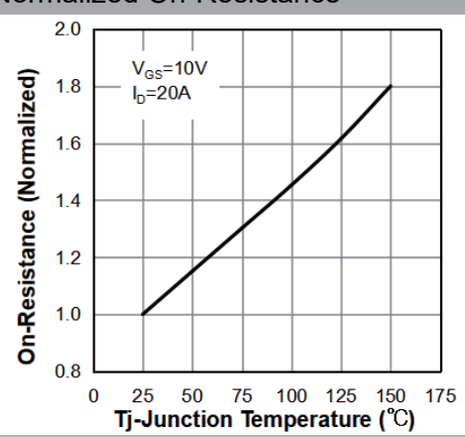


Fig. 6 On-Resistance vs. Junction Temperature/ Normalized On-Resistance



Electrical Characteristics Curves

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

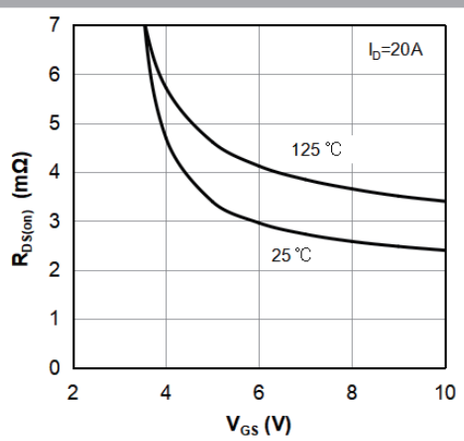


Fig. 8 Body-Diode Characteristics

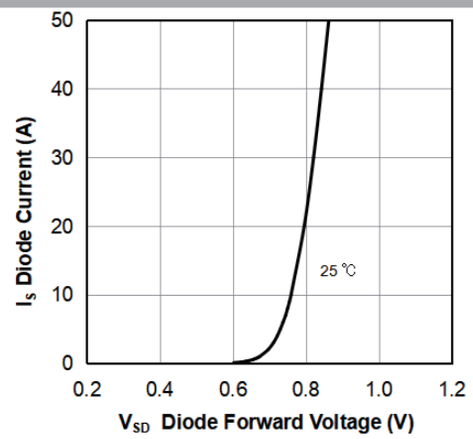


Fig. 9 Capacitance Characteristics

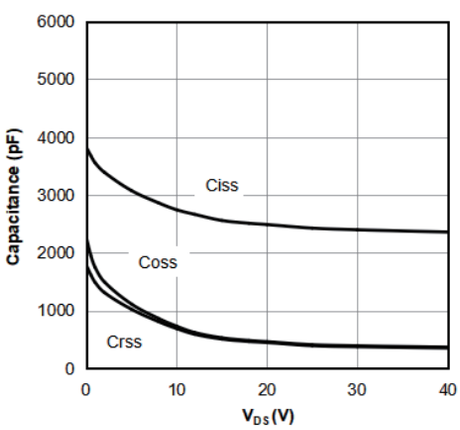


Fig. 10 Gate Charge Characteristics

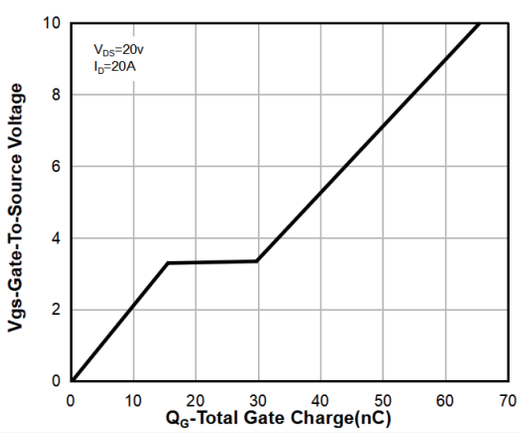
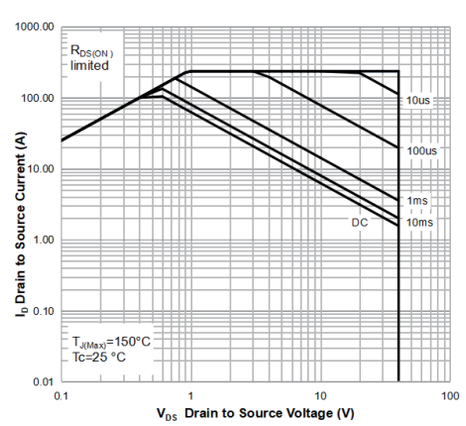
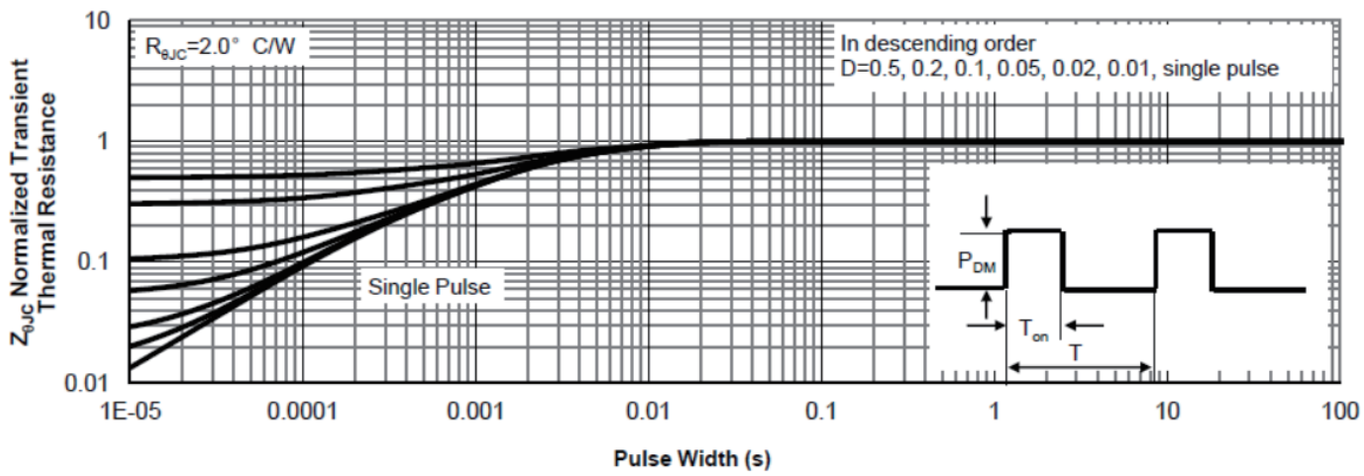


Fig. 11 Safe Operation Area



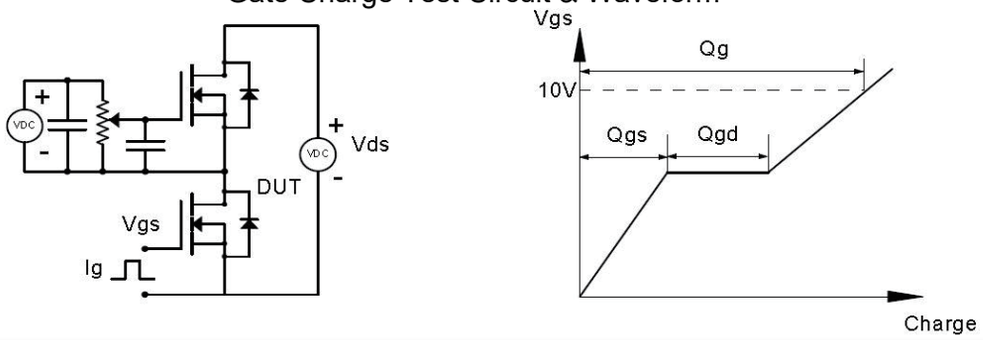
Electrical Characteristics Curves

Fig. 12 Normalized Maximum Transient thermal impedance

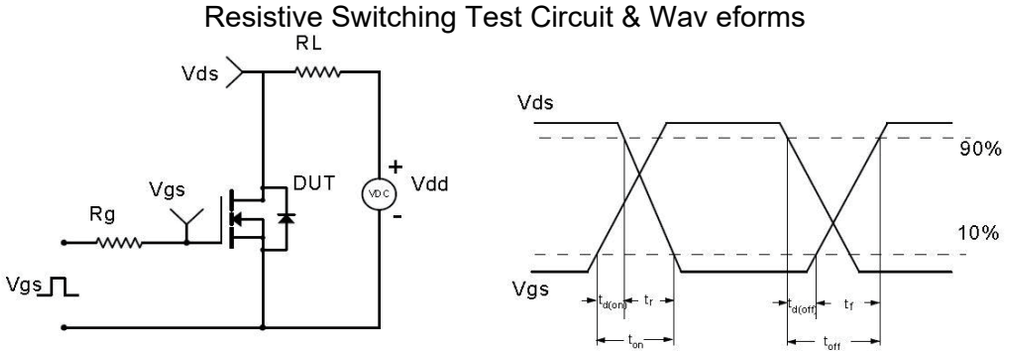


Test Circuit

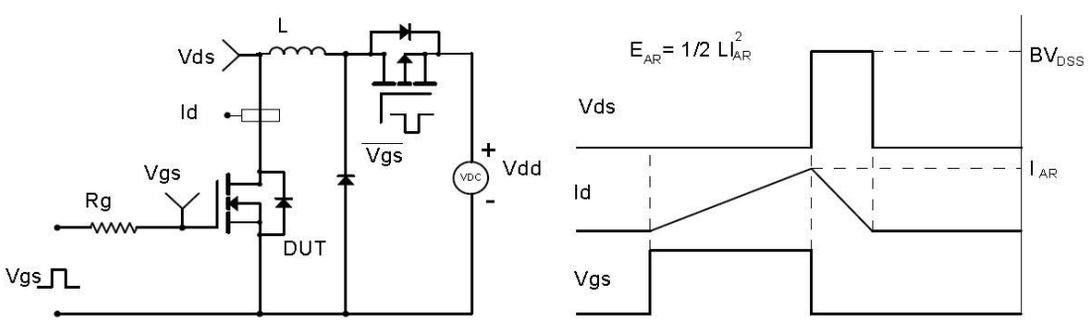
Gate Charge Test Circuit & Waveform



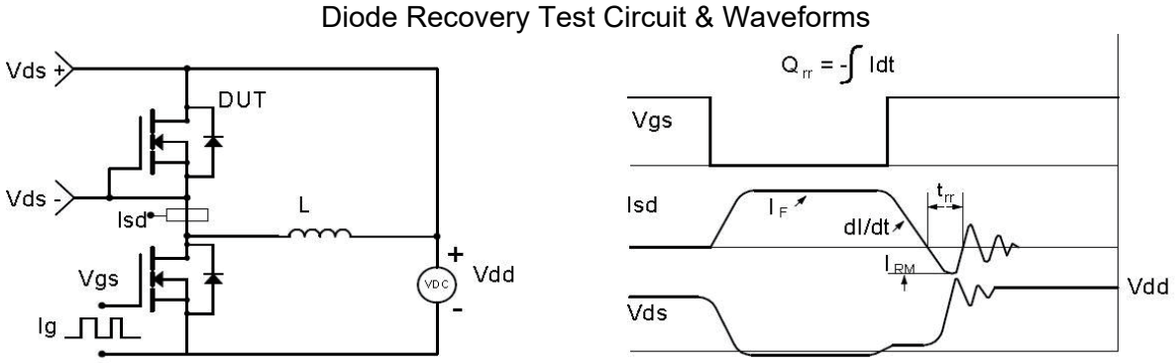
Resistive Switching Test Circuit & Wav eforms



Unclamped Inductive Switching (UIS) T est Circuit & Waveforms

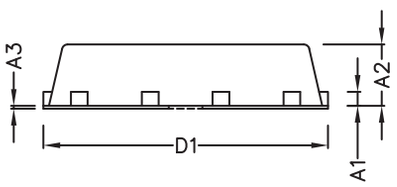


Diode Recovery Test Circuit & Waveforms

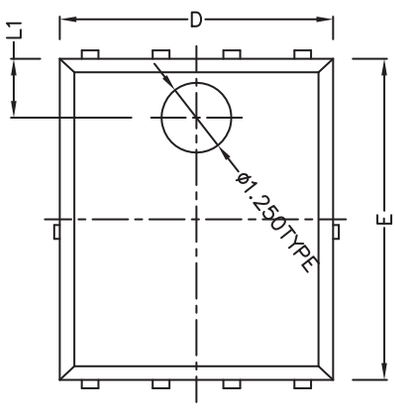


DFN5*6-8L Package Outine & Dimensions (Units: mm / in)

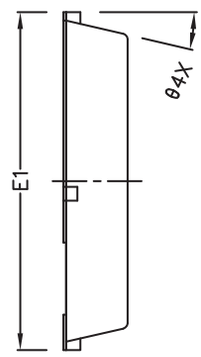
PDFN5*6-8L



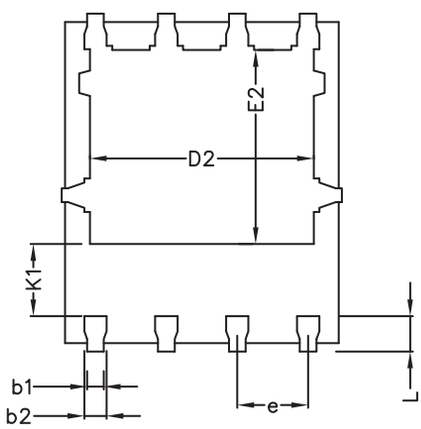
SIDE VIEW



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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ROHS

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