

# UN0315N1R6-PD56

N-Channel Enhancement Mode MOSFET

ROHS

## Product Summary

VDS	30V
ID(@TA=25°C)	152A
R <sub>DS(ON)</sub> (@VGS=10V ID=20A)	≤2.4mΩ
R <sub>DS(ON)</sub> (@VGS=4.5V ID=20A)	≤3.5mΩ

## Features

- ◆ Proprietary Trench Gate Device Design and Processes
- ◆ Extremely low on-resistance R<sub>DS(ON)</sub>
- ◆ 100% Avalanche Tested
- ◆ Reliable and Rugged
- ◆ RoHS compliant

## Applications

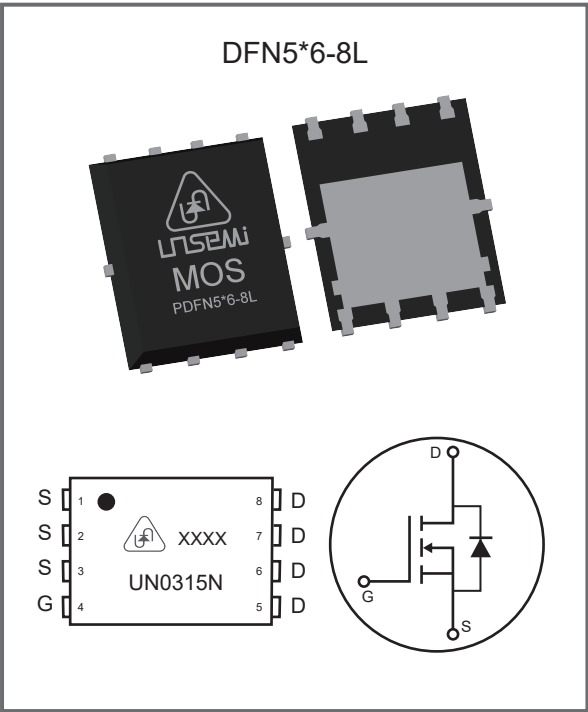
- ◆ DC/DC Converter
- ◆ Battery Management System
- ◆ Industrial and Motor Drive applications
- ◆ Synchronous rectifier applications

## Package Marking And Ordering information

Part Number	Package Type	Packaging	Reel(pcs)
UN0315N1R6-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	30	V
Continuous Drain Current <sup>1)</sup>	@TC=25°C	ID	152	A
	@TC=100°C		96	
Drain Current Pulsed <sup>2)</sup>		IDM	456	A
Gate-Source Voltage		VGS	±20	V
Single Pulsed Avalanche Energy <sup>3)</sup>		EAS	215	mJ
Power Dissipation	@TC=25°C	PD	100	W
	@TC=100°C		40	
Junction and Storage Temperature Range		Tstg,TJ	-55~150	°C

**Thermal Characteristics**

Parameter	Symbol	Typ	Max	Units
Thermal Resistance from Junction to Ambient	RθJA	--	60	°C/W
Thermal Resistance, Junction to Case	RθJC	--	1.25	°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	BV <sub>DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	30			V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30V , V <sub>GS</sub> = 0V			1.0	μA
Gate-source leakage current	I <sub>GSS</sub>	V <sub>GS</sub> = ±20V , V <sub>DS</sub> = 0V			±100	nA
Gate-Source Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> = V <sub>DS</sub> , I <sub>D</sub> = 250μA	1.0	2.0	3.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 10V , I <sub>D</sub> = 20A		1.6	2.4	mΩ
		V <sub>GS</sub> = 4.5V , I <sub>D</sub> = 20A		2.3	3.5	mΩ
Forward Transconductance(GMP)	G <sub>FS</sub>	V <sub>DS</sub> = 5.0V, I <sub>D</sub> = 20A		38		S
Body-Diode PARAMETERS						
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> = 10A, V <sub>GS</sub> = 0V		0.7	1.1	V
Body Diode Reverse Recovery Time	trr	I <sub>F</sub> = 20A di/dt = 100A/μs		67		ns
Body Diode Reverse Recovery Charge	Qrr			83		nC
DYNAMIC PARAMETERS <sup>4)</sup>						
Gate Resistance	R <sub>G</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 0V, F = 1MHz		1.8		Ω
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0V V <sub>DS</sub> = 15V F = 1MHz		3927		pF
Output Capacitance	C <sub>oss</sub>			853		pF
Reverse Transfer Capacitance	C <sub>rss</sub>			780		pF
Gate charge Total	Q <sub>g</sub>	V <sub>GS</sub> = 10V V <sub>DS</sub> = 15V I <sub>D</sub> = 20A		63.2		nC
Gate to Source Charge	Q <sub>gs</sub>			11.0		nC
Gate to Drain Charge	Q <sub>gd</sub>			12.7		nC
SWITCHING PARAMETERS <sup>4)</sup>						
Turn-On Delay Time	td(ON)	V <sub>DS</sub> = 15V, V <sub>GS</sub> = 10V R <sub>G</sub> = 2.7Ω		15.8		ns
Turn-On Rise Time	tr			18.5		ns
Turn-Off Delay Time	td(OFF)			56.0		ns
Turn-Off Fall Time	tf			20.2		ns

## Electrical Characteristics Curves

Fig. 1 Power Derating

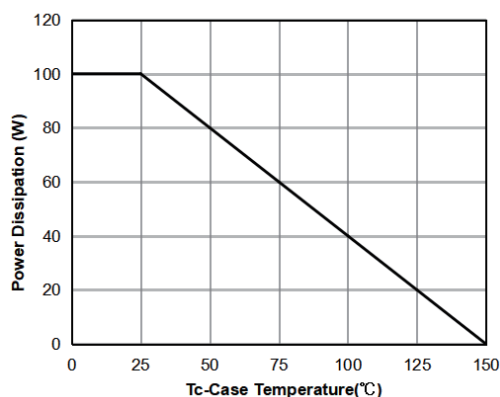


Fig. 2 Maximum Drain Current vs. Case Temperature

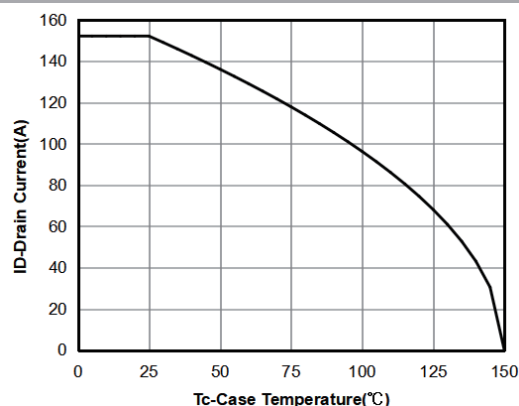


Fig. 3 Output Characteristics

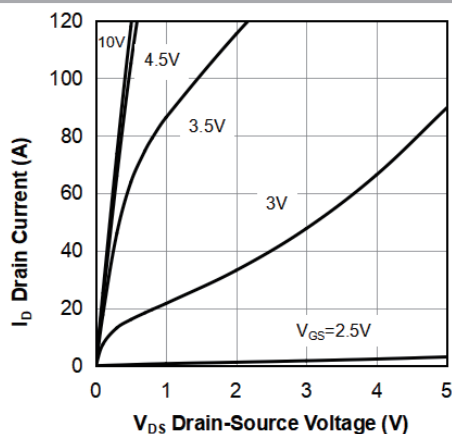


Fig. 4 Transfer Characteristics

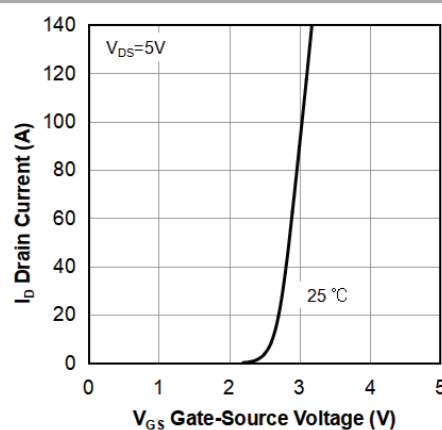


Fig. 5 On-Resistance vs. Drain Current and Gate Voltage

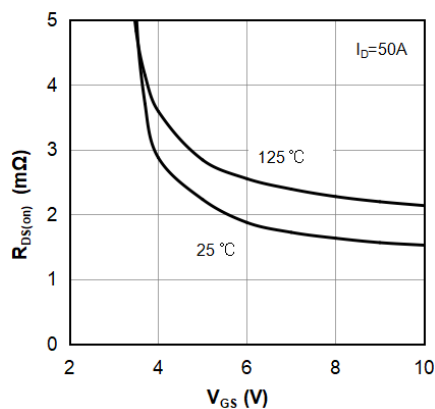
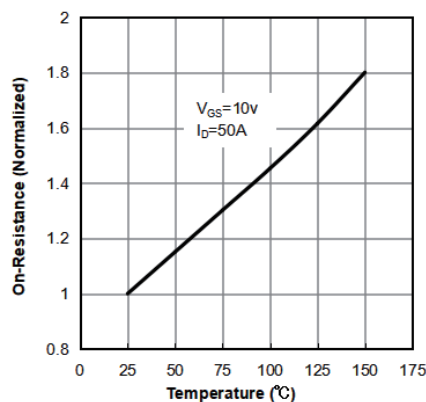


Fig. 6 On-Resistance vs. Junction Temperature/ Normalized On-Resistance



## Electrical Characteristics Curves

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

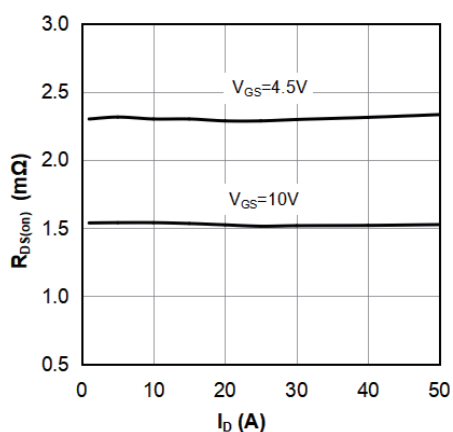


Fig. 8 Body-Diode Characteristics

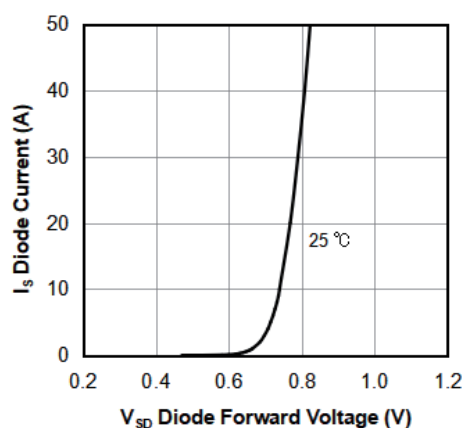


Fig. 9 Capacitance Characteristics

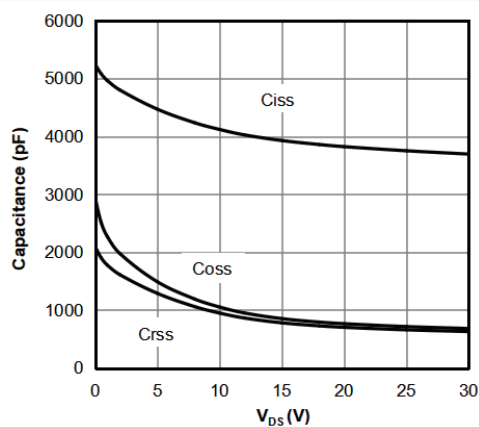


Fig. 10 Gate Charge Characteristics

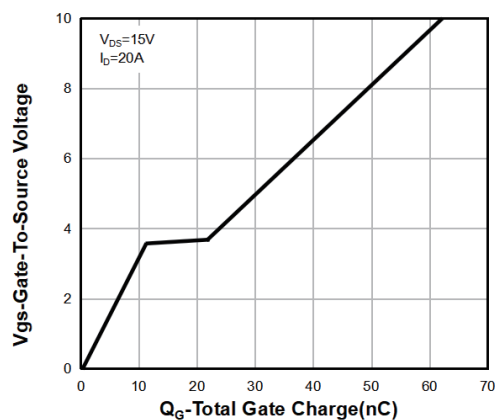
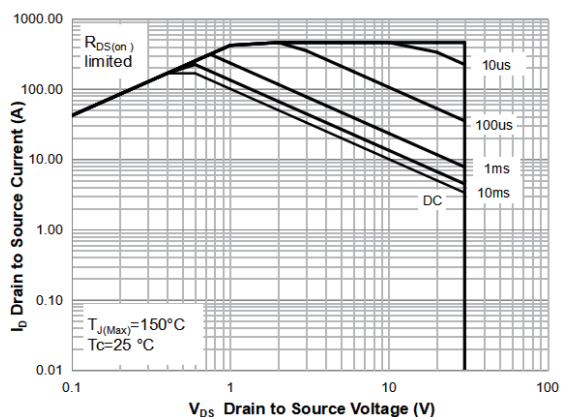
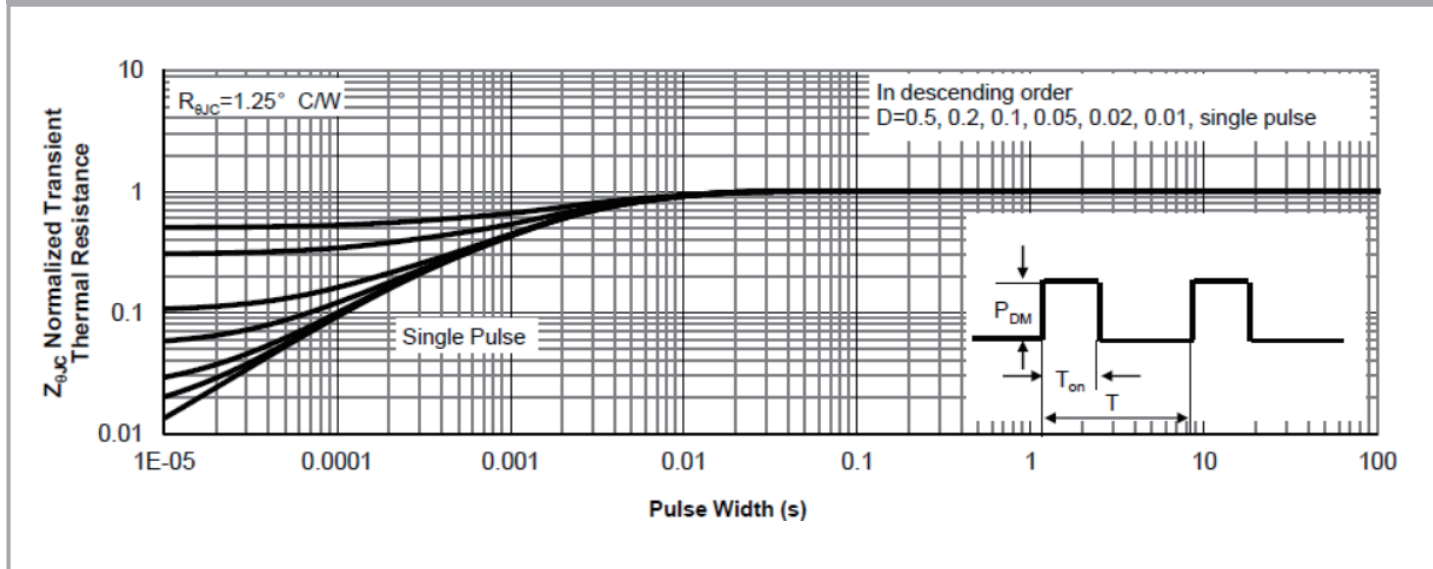


Fig. 11 Safe Operation Area



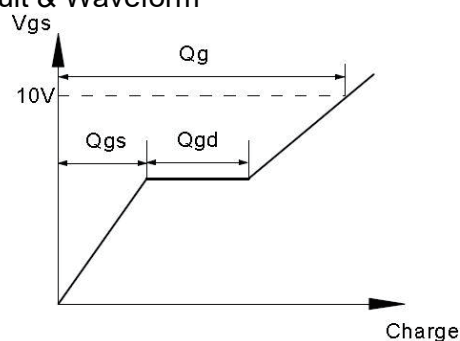
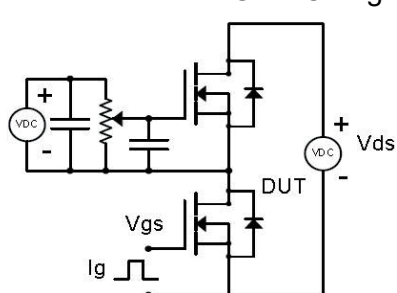
## Electrical Characteristics Curves

Fig. 12 Normalized Maximum Transient thermal impedance

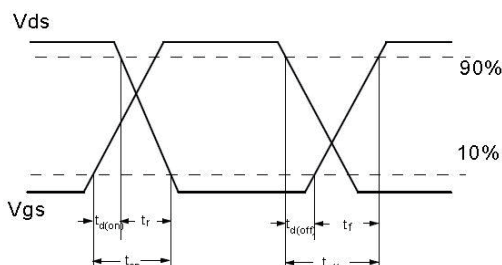
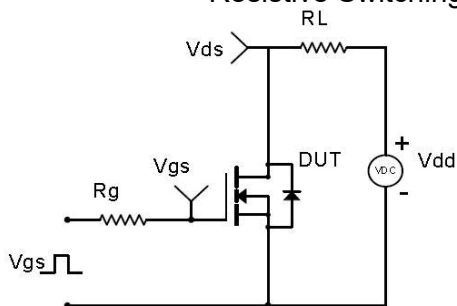


## Test Circuit

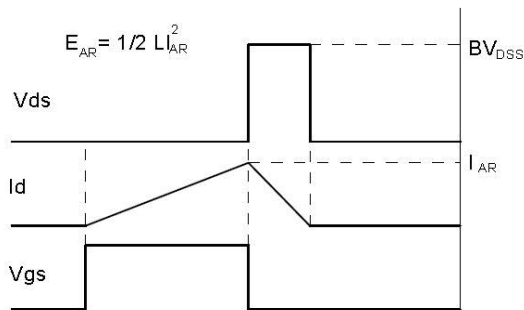
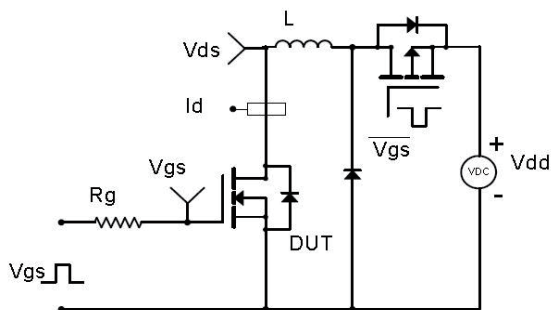
Gate Charge Test Circuit & Waveform



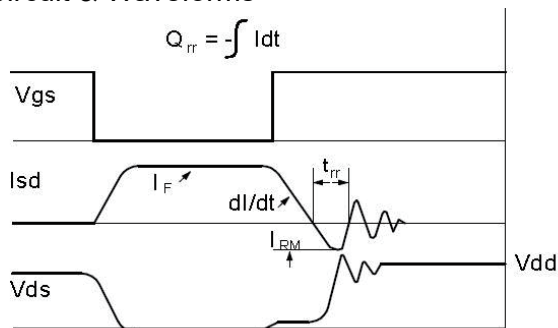
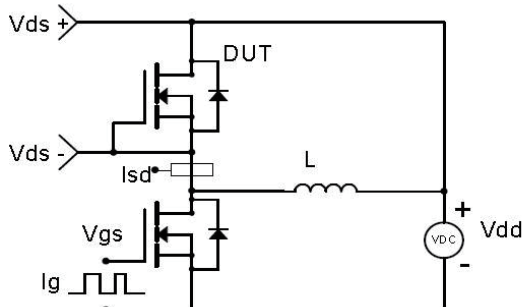
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

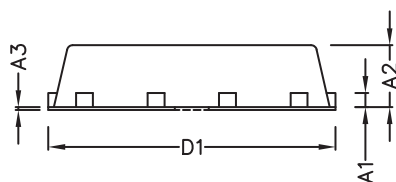


Diode Recovery Test Circuit & Waveforms

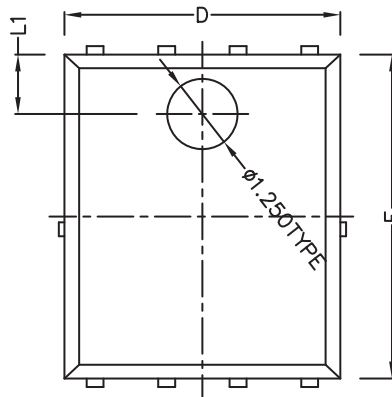


DFN5\*6-8L Package Outline & Dimensions (Units: mm / in)

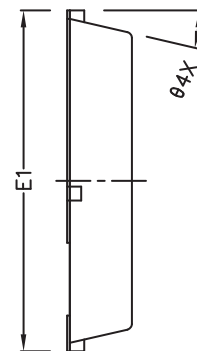
PDFN5\*6-8L



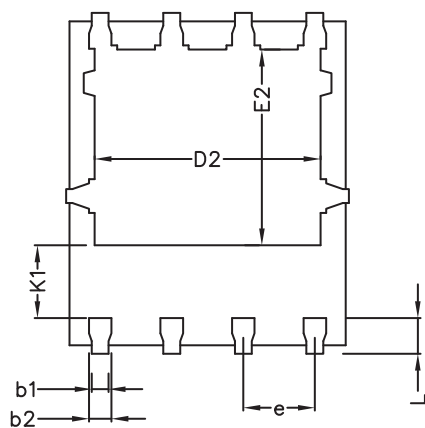
SIDE VIEW



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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