

P-Channel Enhancement Mode Power MOSFET

30V P-Channel MOSFET

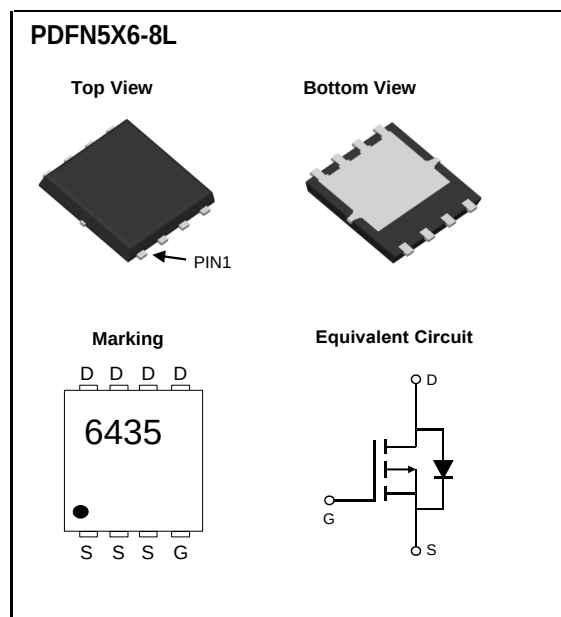
$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-30V	0.012Ω@ -10V	-34 A
	0.020Ω@ -5.0V	

General FEATURE

- Tower MOSFET
- Lead free product is acquired
- Surface mount package

APPLICATION

- Load Switch for Portable Devices
- DC/DC Converter



Absolute Maximum Ratings T _A =25°C unless otherwise noted					
Parameter		Symbol	Maximum		Units
Drain-Source Voltage		V _{DS}	-30		V
Gate-Source Voltage		V _{GS}	±25		V
Continuous Drain Current	T _C =25°C	I _D	-34		A
	T _C =100°C		-21.5		
Pulsed Drain Current ^C		I _{DM}	-95		
Continuous Drain Current	T _A =25°C	I _{DSM}	-12		A
	T _A =70°C		-10		
Avalanche Current ^C		I _{AS}	24		A
Avalanche energy L=0.1mH ^C		E _{AS}	29		mJ
Power Dissipation ^B	T _C =25°C	P _D	31		W
	T _C =100°C		12.5		
Power Dissipation ^A	T _A =25°C	P _{DSM}	4.1		W
	T _A =70°C		2.6		
Junction and Storage Temperature Range		T _J , T _{STG}	-55 to 150		°C
Thermal Characteristics					
Parameter		Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^A	t ≤ 10s	R _{θJA}	24	30	°C/W
Maximum Junction-to-Ambient ^{A D}	Steady-State		53	64	°C/W
Maximum Junction-to-Case	Steady-State	R _{θJC}	3.4	4	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV _{DSS}	Drain-Source Breakdown Voltage	I _D =-250μA, V _{GS} =0V	-30			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-30V, V _{GS} =0V			-1	μA
I _{GSS}	Gate-Body leakage current	V _{DS} =0V, V _{GS} =±25V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-1.7	-2.3	-3	V
I _{D(ON)}	On state drain current	V _{GS} =-10V, V _{DS} =-5V	-95			A
R _{DS(ON)}	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-20A		12	15	mΩ
		V _{GS} =-5V, I _D =-15A		20	25	Ω
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-20A		28		S
V _{SD}	Diode Forward Voltage	I _S =-1A, V _{GS} =0V		-0.73	-1	V
I _S	Maximum Body-Diode Continuous Current				-35	A
DYNAMIC PARAMETERS						
C _{iss}	Input Capacitance	V _{GS} =0V, V _{DS} =-15V, f=1MHz		1130	1400	pF
C _{oss}	Output Capacitance			240		pF
C _{rss}	Reverse Transfer Capacitance			155		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1MHz		5.8	8	Ω
SWITCHING PARAMETERS						
Q _g (10V)	Total Gate Charge	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		21		nC
Q _g (4.5V)	Total Gate Charge			10		nC
Q _{gs}	Gate Source Charge			4		nC
Q _{gd}	Gate Drain Charge			6		nC
t _{D(on)}	Turn-On DelayTime	V _{GS} =-10V, V _{DS} =-15V, R _L =0.75Ω, R _{GEN} =3Ω		10		ns
t _r	Turn-On Rise Time			8		ns
t _{D(off)}	Turn-Off DelayTime			15		ns
t _f	Turn-Off Fall Time			7		ns
t _{rr}	Body Diode Reverse Recovery Time	I _F =-20A, dI/dt=500A/μs		13.5		ns
Q _{rr}	Body Diode Reverse Recovery Charge	I _F =-20A, dI/dt=500A/μs		29		nC

A. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The Power dissipation P_{DSM} is based on R_{θJA} and the maximum allowed junction temperature of 150° C. The value in any given application depends on the user's specific board design, and the maximum temperature of 150° C may be used if the PCB allows it.

B. The power dissipation P_D is based on T_{J(MAX)}=150° C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150° C. Ratings are based on low frequency and duty cycles to keep initial T_J=25° C. Maximum UIS current limited by test equipment.

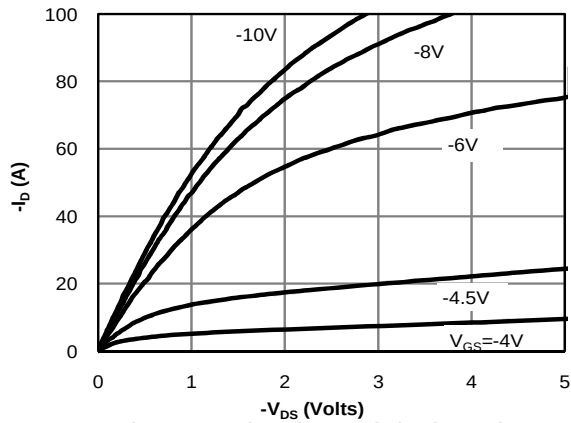
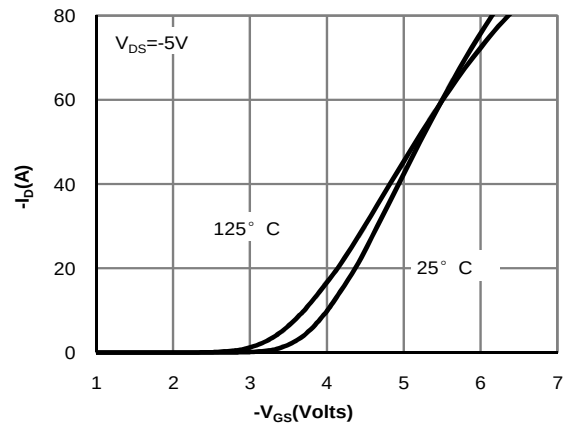
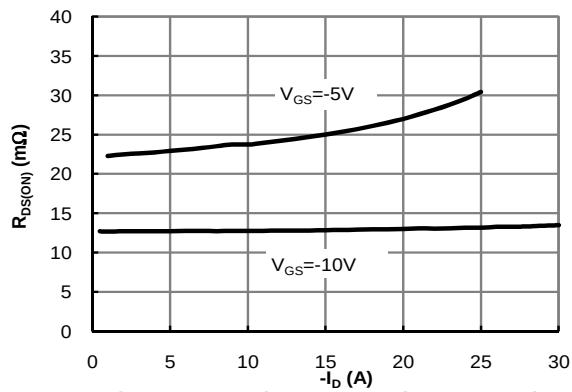
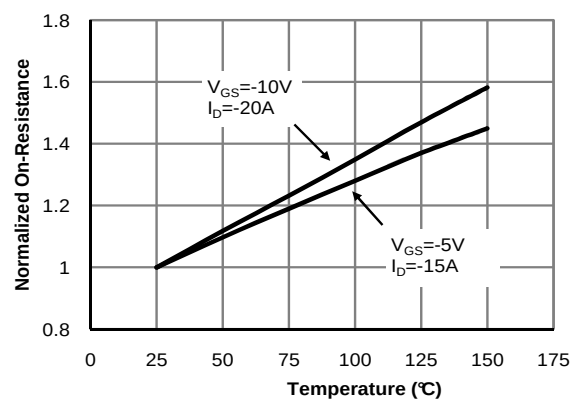
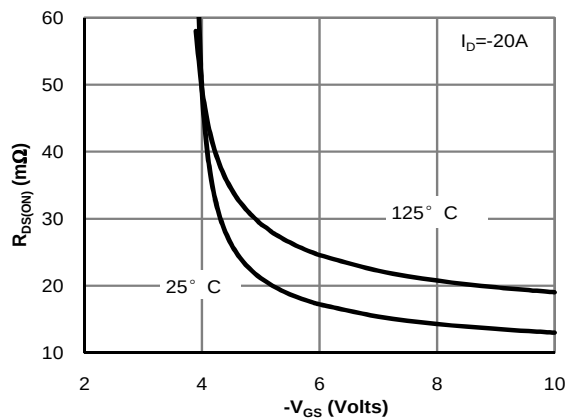
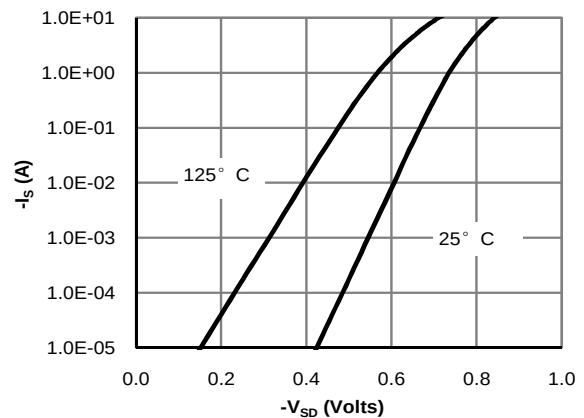
D. The R_{θJA} is the sum of the thermal impedance from junction to case R_{θJC} and case to ambient.

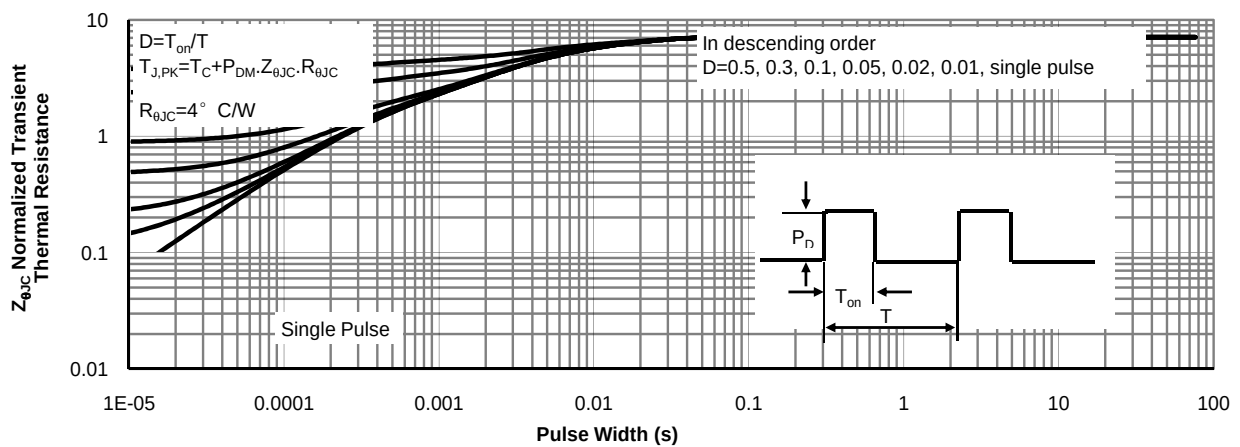
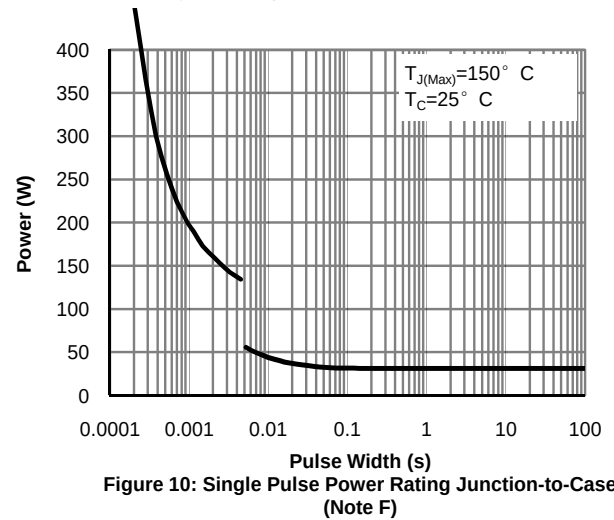
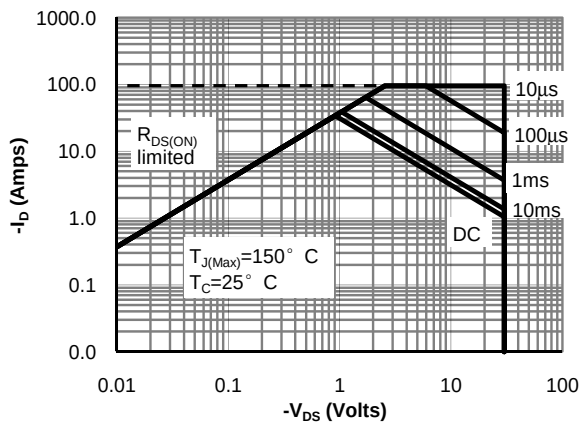
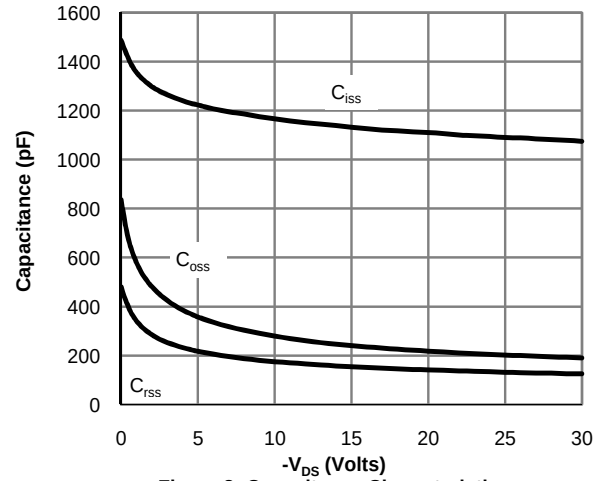
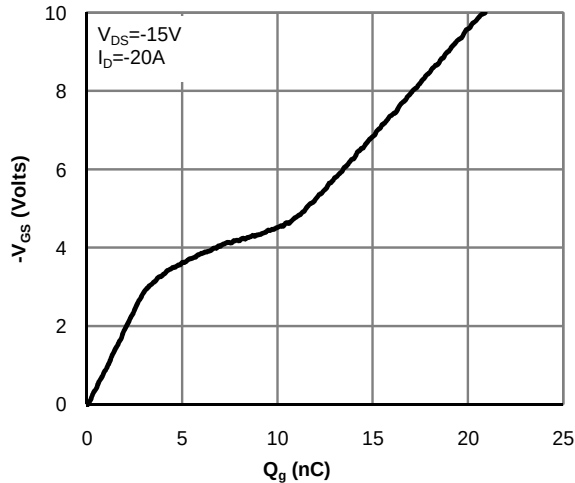
E. The static characteristics in Figures 1 to 6 are obtained using <300μs pulses, duty cycle 0.5% max.

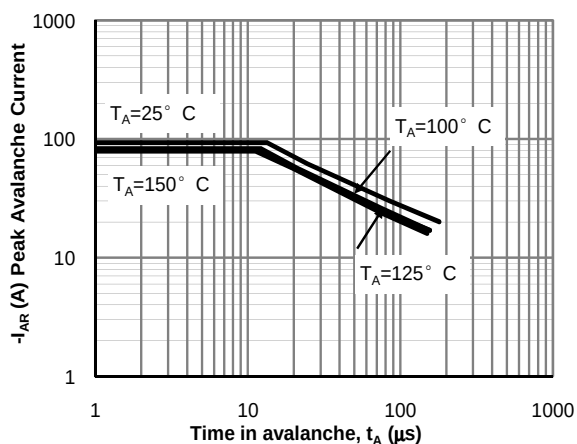
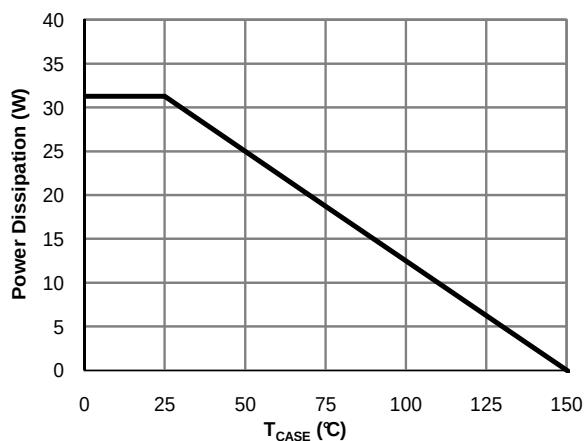
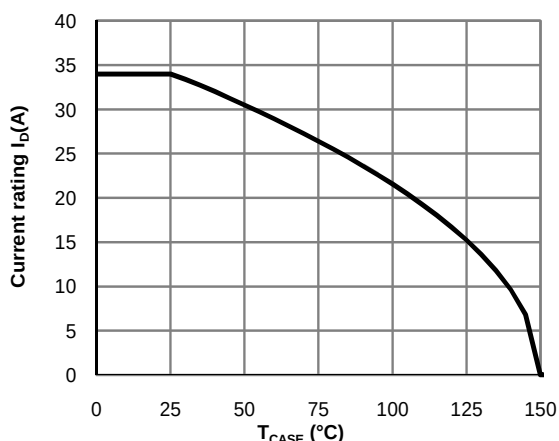
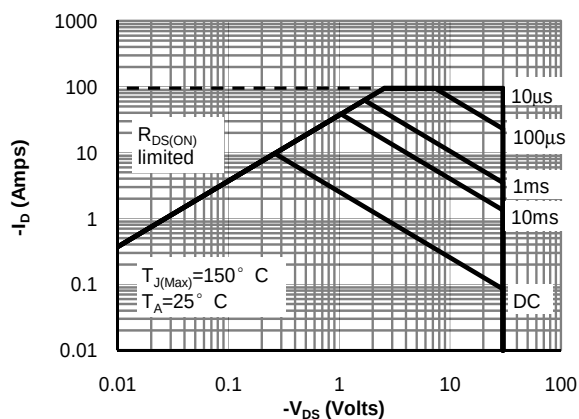
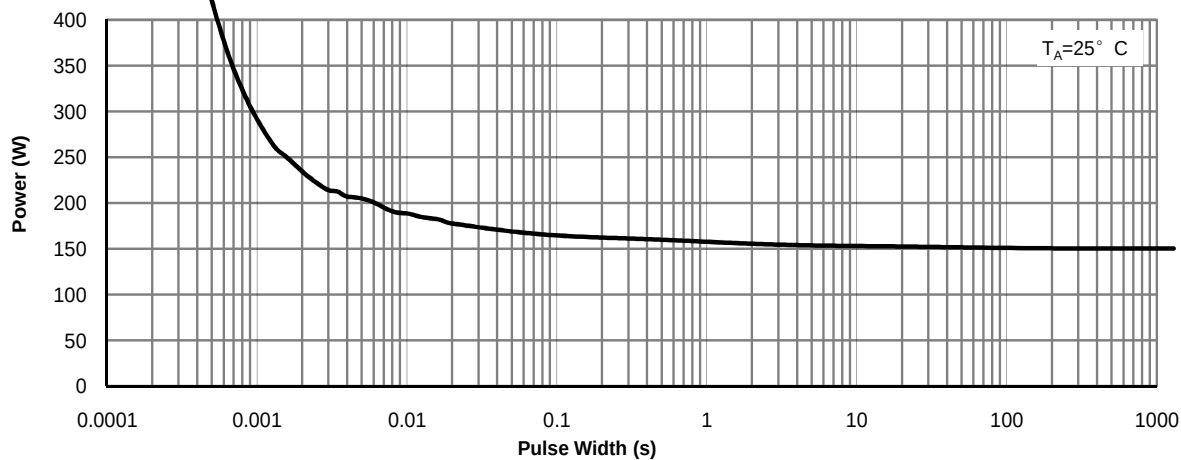
F. These curves are based on the junction-to-case thermal impedance which is measured with the device mounted to a large heatsink, assuming a maximum junction temperature of T_{J(MAX)}=150° C. The SOA curve provides a single pulse rating.

G. The maximum current rating is package limited.

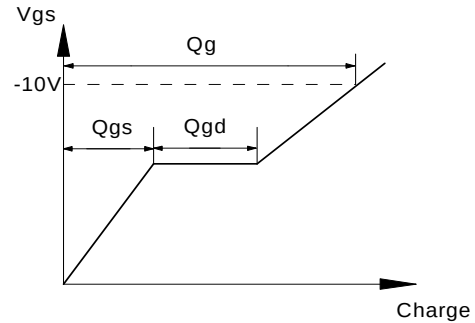
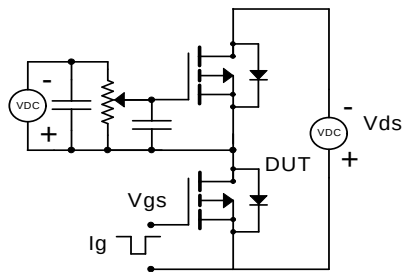
H. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Fig 1: On-Region Characteristics (Note E)

Figure 2: Transfer Characteristics (Note E)

Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

Figure 4: On-Resistance vs. Junction Temperature (Note E)

Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

Figure 6: Body-Diode Characteristics (Note E)

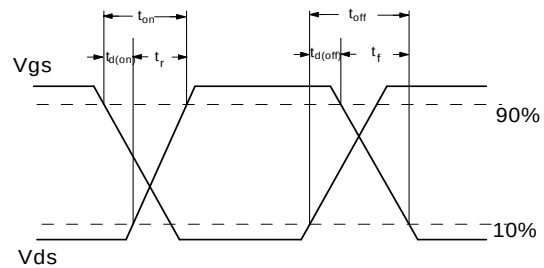
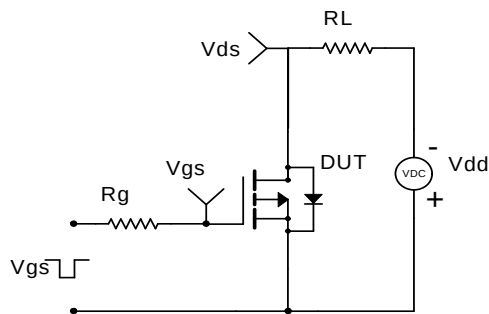
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS


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Figure 12: Single Pulse Avalanche capability (Note C)

Figure 13: Power De-rating (Note F)

Figure 14: Current De-rating (Note F)

Figure 15: Maximum Forward Biased Safe Operating Area (Note H)

Figure 16: Single Pulse Power Rating Junction-to-Ambient (Note H)

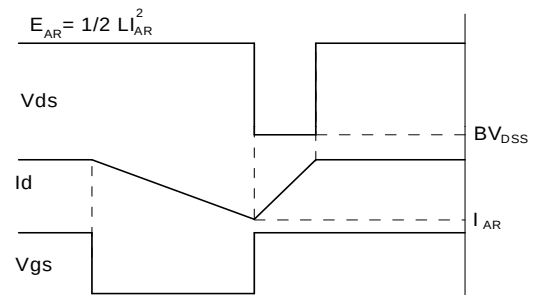
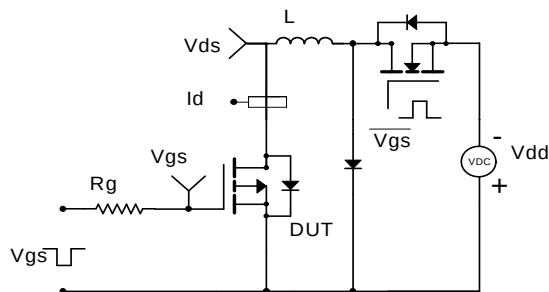
Gate Charge Test Circuit & Waveform



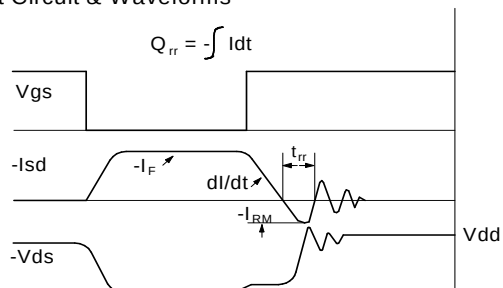
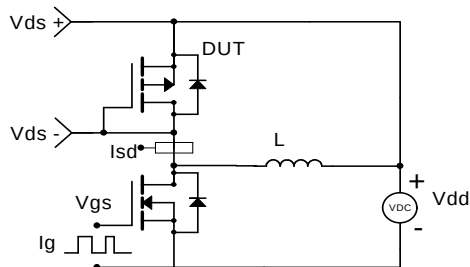
Resistive Switching Test Circuit & Waveforms



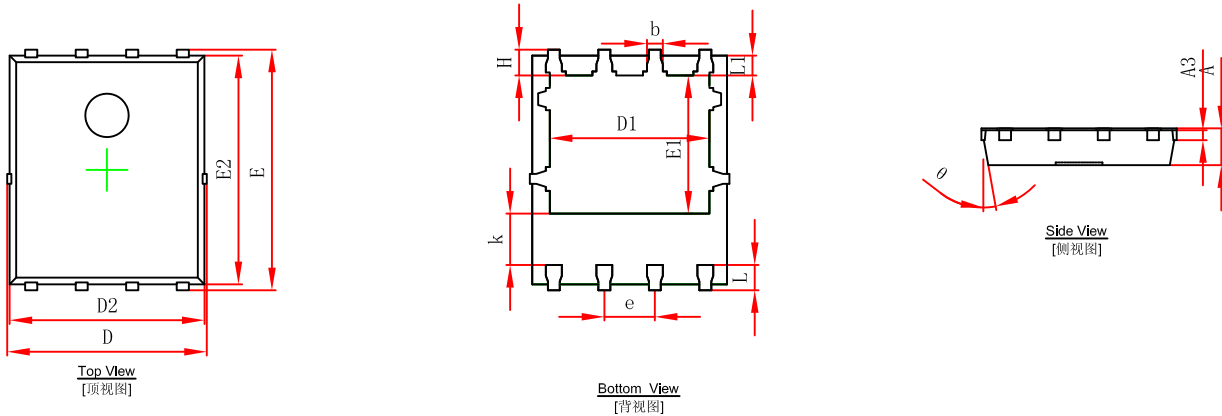
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

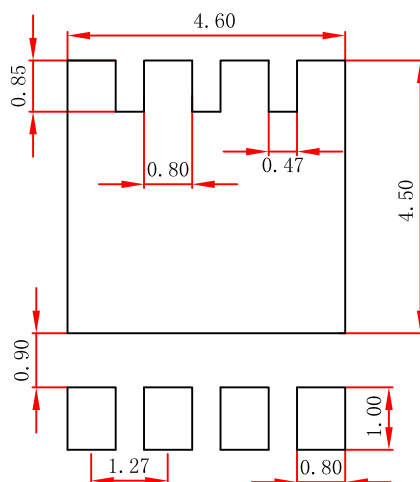


PDFNWB5x6-8L Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



Note:
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.