



N And P-Channel Enhancement Mode Power MOSSFET

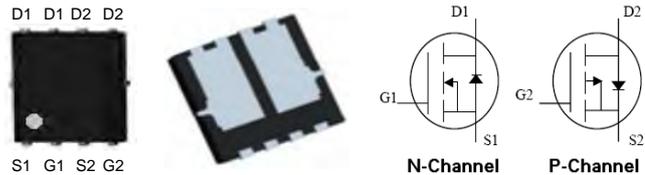
Features

- Low $R_{DS(on)}$ @ $V_{GS}=5V$
- 5V Logic Level Control
- N+P Dual Channel PDFN3333 Package
- Pb-Free, RoHS Compliant

Key Items	NMOS	PMOS	Unit
BVDSS	30	-30	V
ID	15	-11	A
R _{DS(on)1}	16	25	mΩ
R _{DS(on)2}	21	35	mΩ

Applications

- DC Fan
- Brushless motor
- Optimized for Power Management Applications for Portable Products, such as H-bridge, Inverters Car Charger and Others



Order Information

PDFN3333

Product	Package	Marking	Packing	Min Unit Quantity
PTQ15C03	PDFN3333	PTQ15C03	5000PCS/Reel	5000PCS

Absolute Maximum Ratings

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

Symbol	Parameter	Rating		Unit	
		NMOS	PMOS		
Common Ratings (TC=25°C Unless Otherwise Noted)					
V_{GS}	Gate-Source Voltage	±20	±20	V	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	30	-30	V	
T_J	Maximum Junction Temperature	150		°C	
T_{STG}	Storage Temperature Range	-50 to 150		°C	
I_S	Diode Continuous Forward Current ^①	$T_C=25^\circ C$	15	-11	A
Mounted on Large Heat Sink					
I_{DM}	Pulse Drain Current Tested ^②	$T_C=25^\circ C$	60	-44	A
I_D	Continuous Drain Current($V_{GS}=10V$)	$T_C=25^\circ C$	15	-11	A
P_D	Maximum Power Dissipation	$T_C=25^\circ C$	15		W
$R_{\theta JC}$	Thermal Resistance <i>Junction-to-Case</i> ≤ 5 s	8.3		°C/W	

**N And P-Channel Enhancement Mode Power MOSSFET****N-Channel**

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current ($T_c=25^\circ C$)	$V_{DS}=30V, V_{GS}=0V$	--	--	1	μA
	Zero Gate Voltage Drain Current ($T_c=125^\circ C$)	$V_{DS}=30V, V_{GS}=0V$	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=10A$	--	16	22	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=4.5V, I_D=6A$	--	21	31	m Ω
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V,$ $f=1MHz$	--	584	--	pF
C_{oss}	Output Capacitance		--	112	--	pF
C_{rss}	Reverse Transfer Capacitance		--	96	--	pF
Q_g	Total Gate Charge	$V_{DS}=15V, I_D=10A,$ $V_{GS}=10V$	--	15	--	nC
Q_{gs}	GateSource Charge		--	4.7	--	nC
Q_{gd}	GateDrain Charge		--	3.6	--	nC
Switching Characteristics						
$t_{d(on)}$	Turnon Delay Time	$V_{DD}=30V,$ $I_D=10A,$ $R_G=3.0\Omega,$ $V_{GS}=10V$	--	5	--	ns
t_r	Turnon Rise Time		--	8	--	ns
$t_{d(off)}$	TurnOff Delay Time		-	21	--	ns
t_f	TurnOff Fall Time		--	7	--	ns
Source Drain Diode Characteristics						
I_{SD}	Sourcedrain current(Body Diode) ^①	$T_c=25^\circ C$	--	--	15	A
V_{SD}	Forward on voltage	$T_j=25^\circ C, I_{SD}=15A,$ $V_{GS}=0V$	--	0.82	1.2	V

Notes:

- ① Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
 ② Pulse width limited by maximum allowable junction temperature



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P-Channel

Symbol	Parameter	Condition	Min	Typ	Max	Unit
Static Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current ($T_c=25^\circ C$)	$V_{DS}=-30V, V_{GS}=0V$	--	--	1	μA
	Zero Gate Voltage Drain Current ($T_c=125^\circ C$)	$V_{DS}=-30V, V_{GS}=0V$	--	--	100	μA
I_{GSS}	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-8A$	--	25	34	m Ω
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=-5V, I_D=-5A$	--	35	46	m Ω
Dynamic Electrical Characteristics @ TJ = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V,$ $f=1MHz$	--	1200	--	pF
C_{oss}	Output Capacitance		--	155	--	pF
C_{rss}	Reverse Transfer Capacitance		--	139	--	pF
Q_g	Total Gate Charge	$V_{DS}=-15V, I_D=-8A,$ $V_{GS}=-10V$	--	52	--	nC
Q_{gs}	Gate-Source Charge		--	9.8	--	nC
Q_{gd}	Gate-Drain Charge		--	8.3	--	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=-15V,$ $I_D=-1A,$ $R_G=6\Omega,$ $V_{GS}=-10V$	--	13	--	ns
t_r	Turn-on Rise Time		--	15	--	nS
$t_{d(off)}$	Turn-Off Delay Time		--	198	--	nS
t_f	Turn-Off Fall Time		--	98	--	nS
Source- Drain Diode Characteristics						
I_{SD}	Source-drain current(Body Diode)	$T_c=25^\circ C$	--	--	-11	A
V_{SD}	Forward on voltage	$T_j=25^\circ C, I_{SD}=-11A$ $V_{GS}=0V$	--	-0.80	-1.2	V

Notes:

- ① Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- ② Pulse width limited by maximum allowable junction temperature.



N And P-Channel Enhancement Mode Power MOSFET

N-Channel Typical Characteristics

Figure 1: Output Characteristics

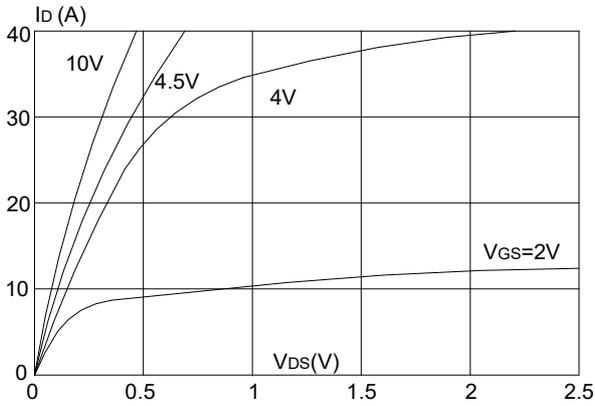


Figure 2: Typical Transfer Characteristics

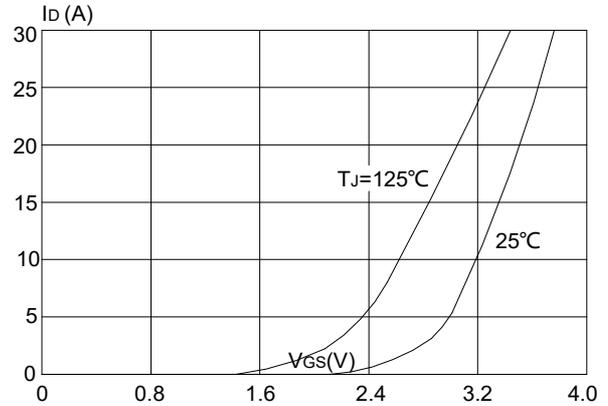


Figure 3: On-resistance vs. Drain Current

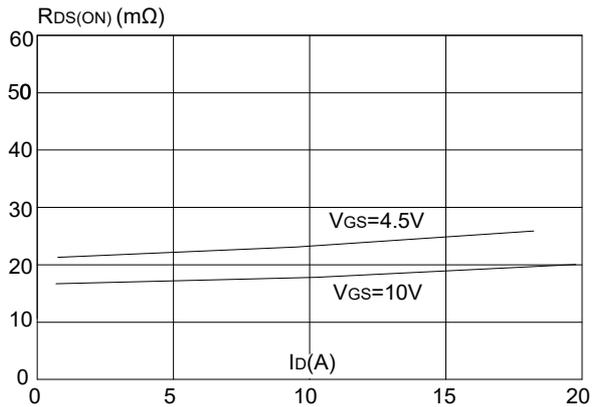


Figure 4: Body Diode Characteristics

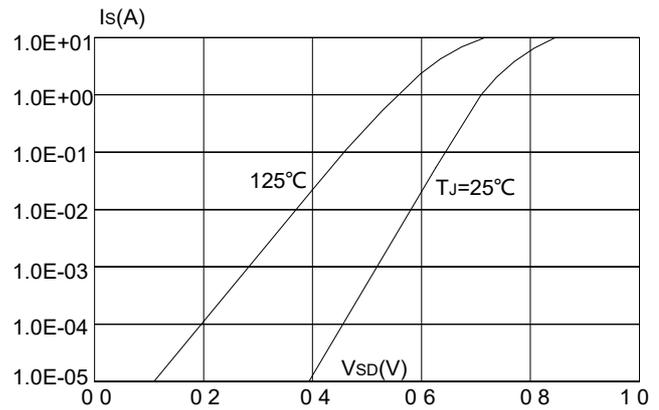


Figure 5: Gate Charge Characteristics

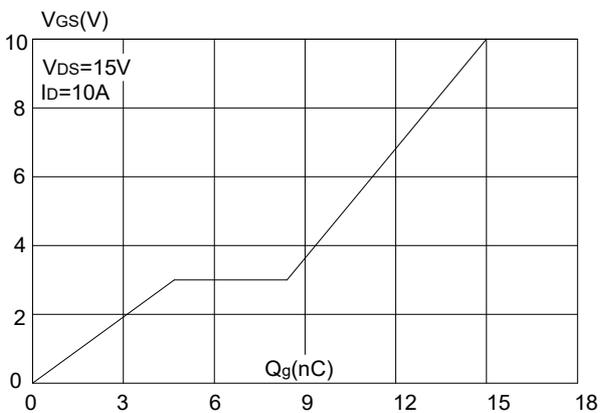
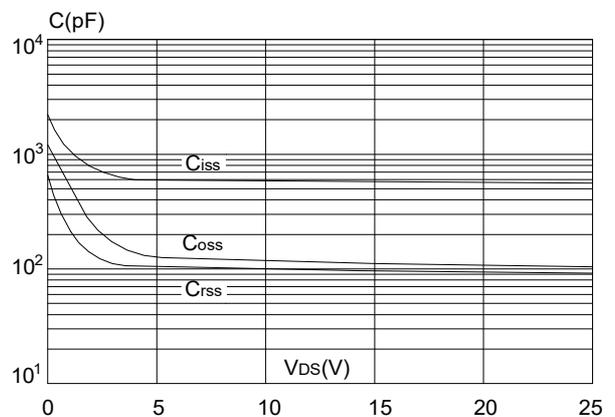


Figure 6: Capacitance Characteristics





N And P-Channel Enhancement Mode Power MOSFET

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

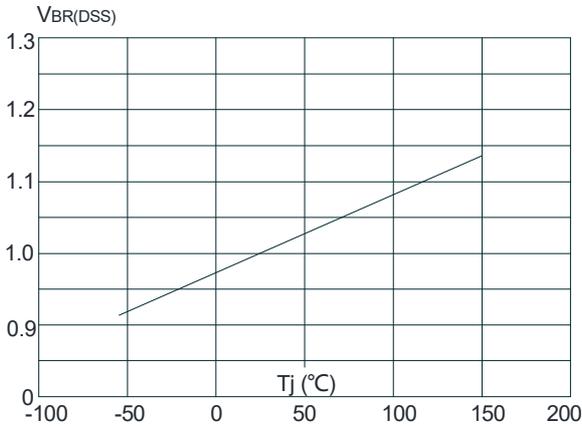


Figure 8: Normalized on Resistance vs. Junction Temperature

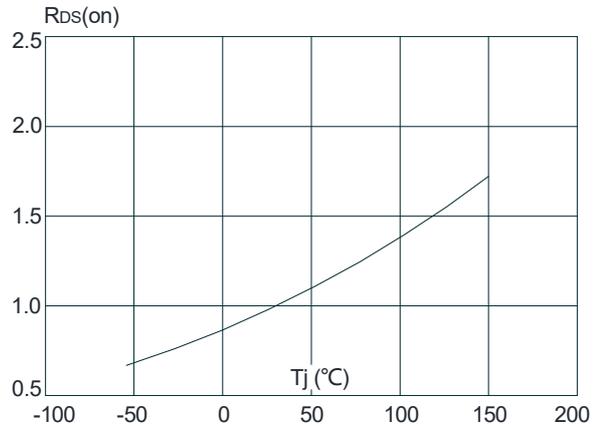


Figure 9: Maximum Safe Operating Area

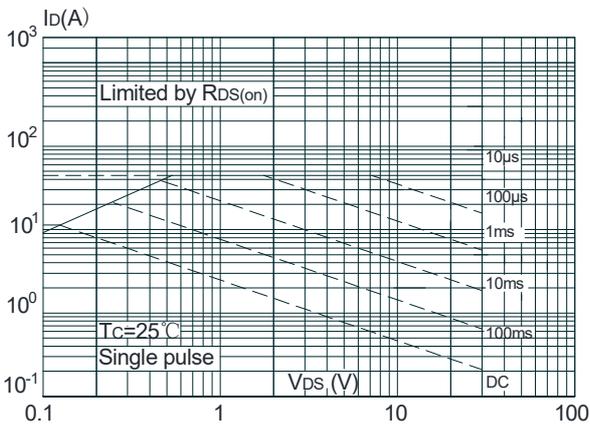


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

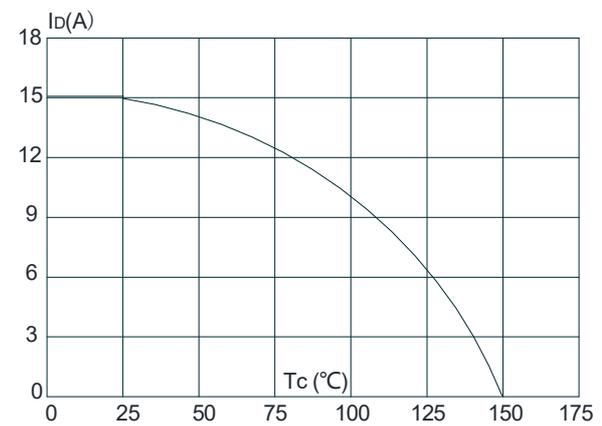
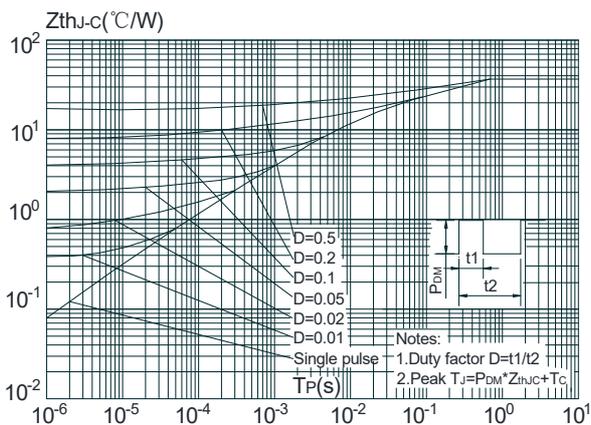


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



N And P-Channel Enhancement Mode Power MOSFET

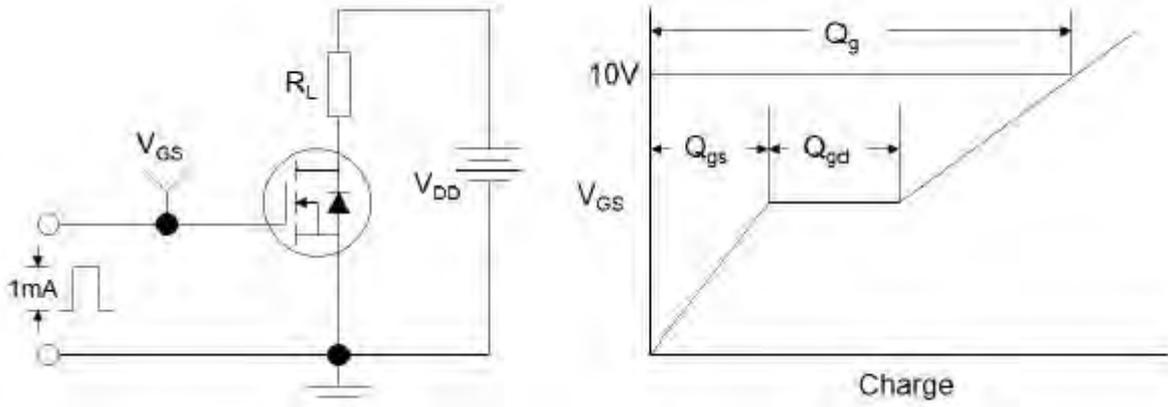


Figure1:Gate Charge Test Circuit & Waveform

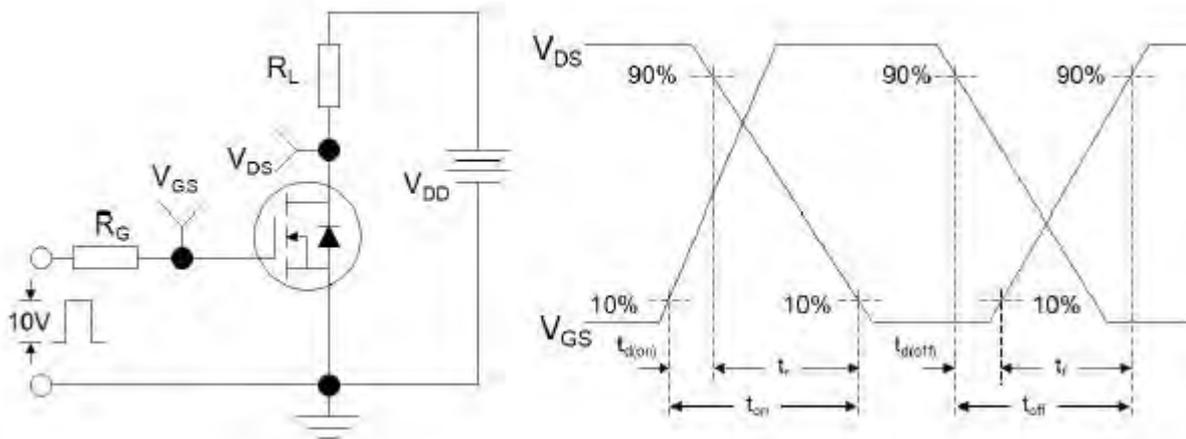


Figure 2: Resistive Switching Test Circuit & Waveforms

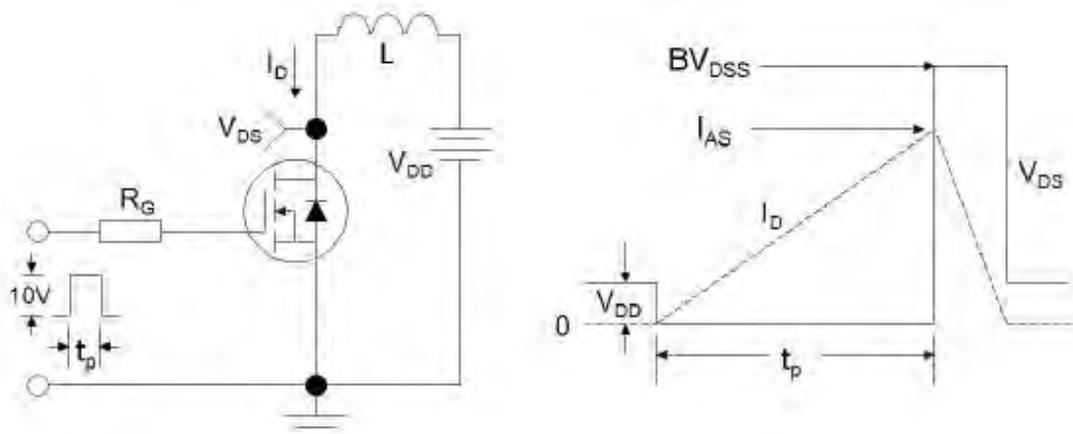


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms



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P-Channel Typical Characteristics

Figure 1: Output Characteristics

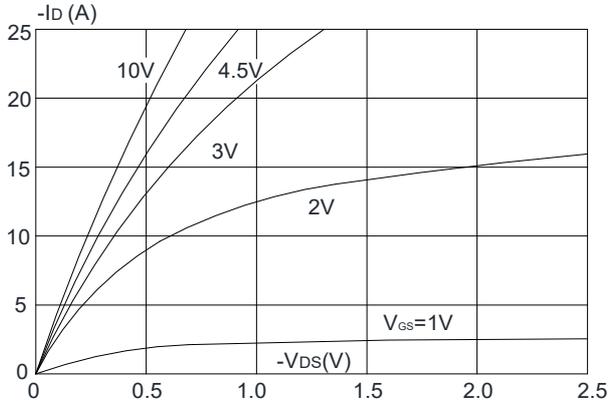


Figure 2: Typical Transfer Characteristics

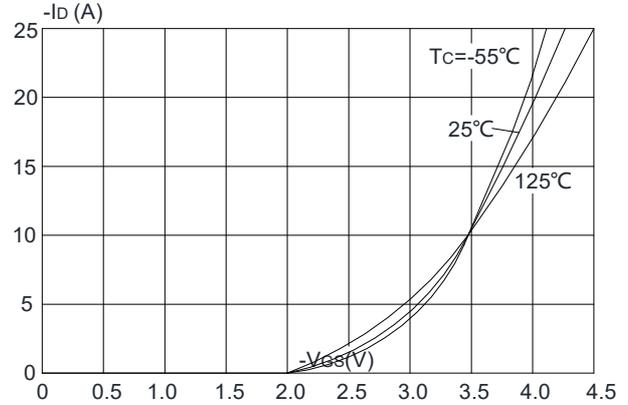


Figure 3: On-resistance vs. Drain Current

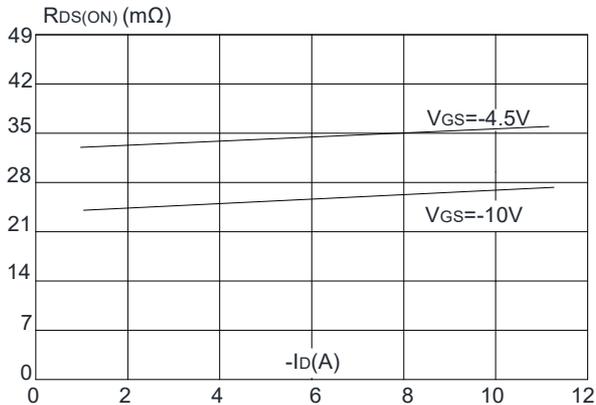


Figure 4: Body Diode Characteristics

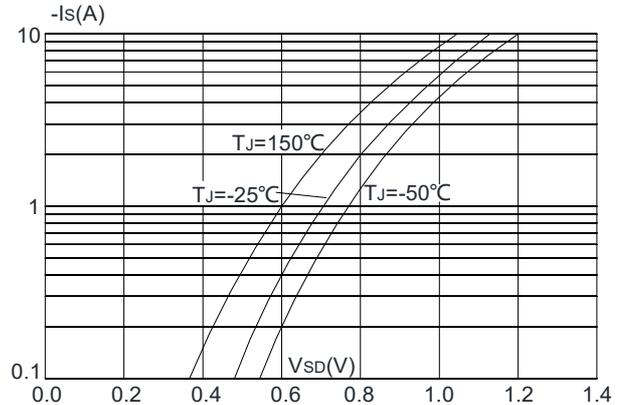


Figure 5: Gate Charge Characteristics

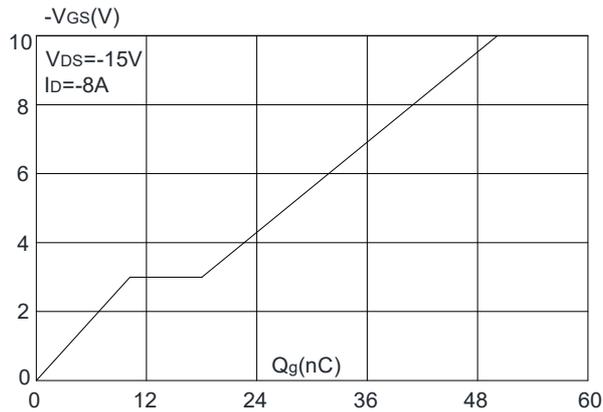
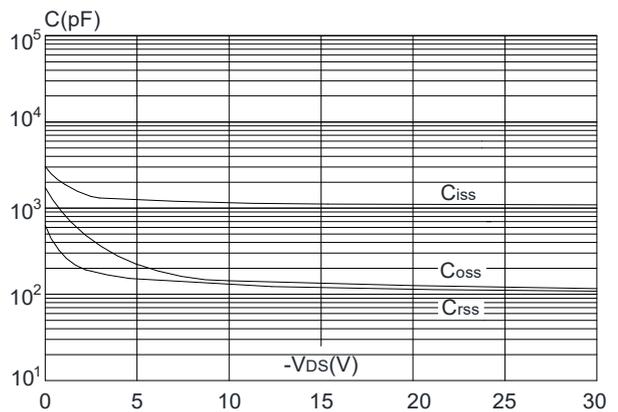


Figure 6: Capacitance Characteristics





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Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

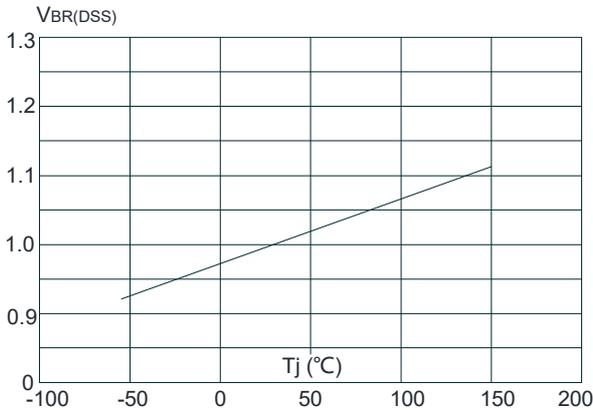


Figure 8: Normalized on Resistance vs. Junction Temperature

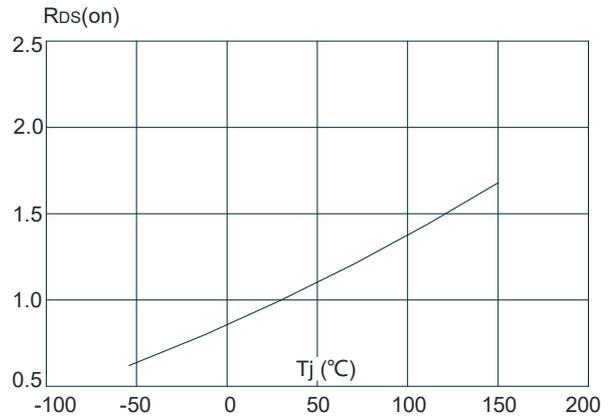


Figure 9: Maximum Safe Operating Area

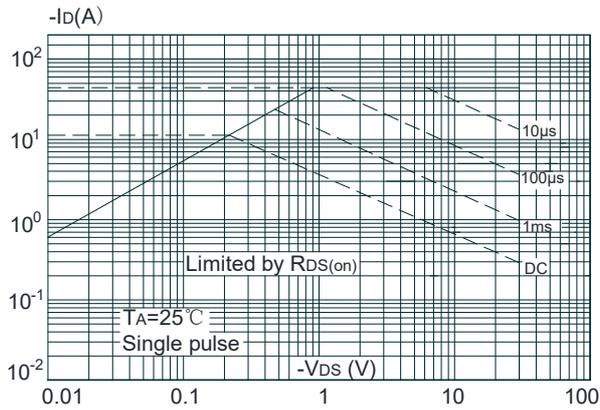


Figure 10: Maximum Continuous Drain Current vs. Ambient Temperature

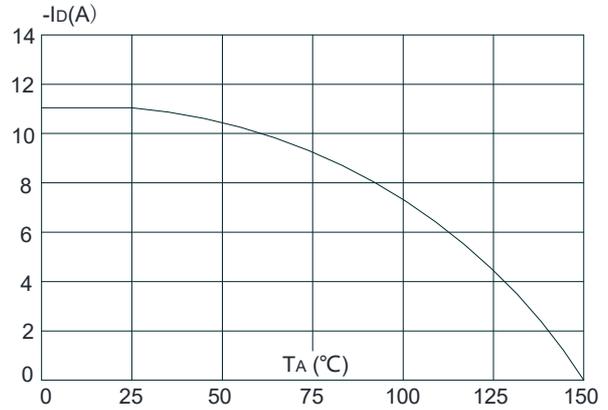
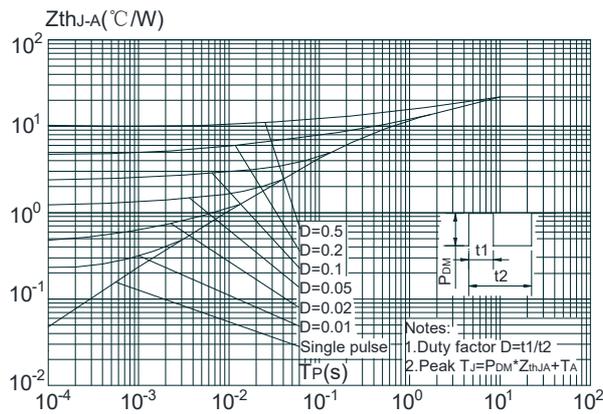
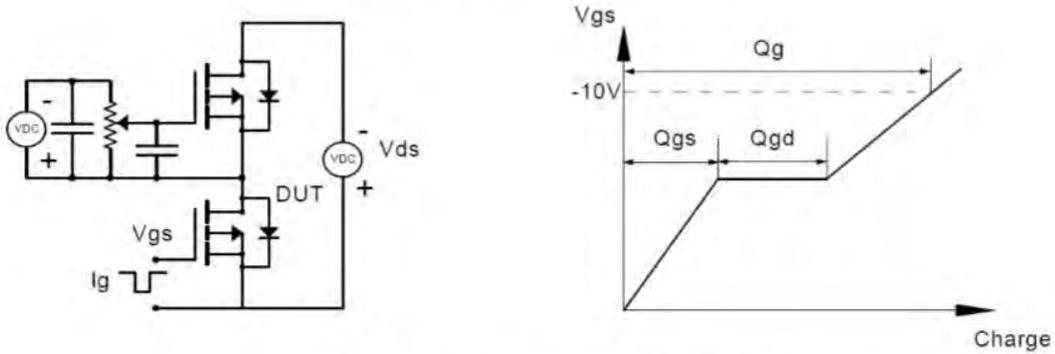
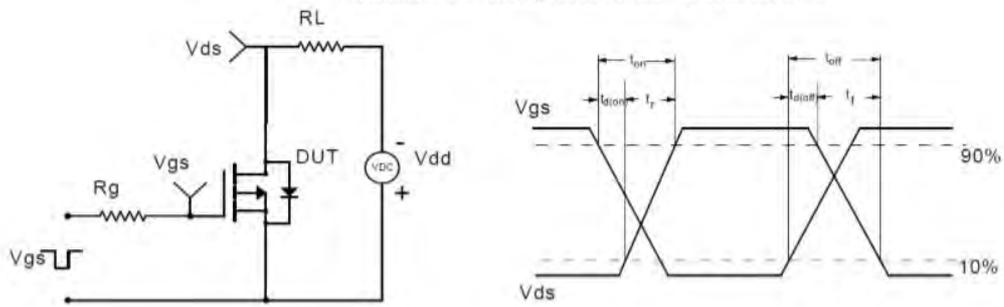
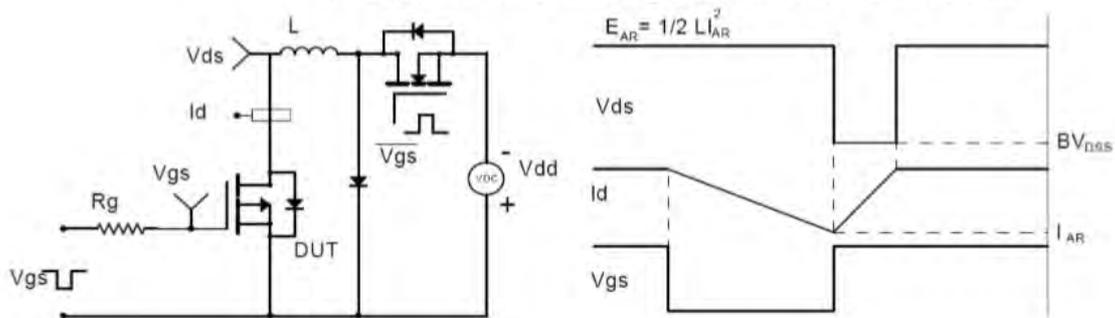
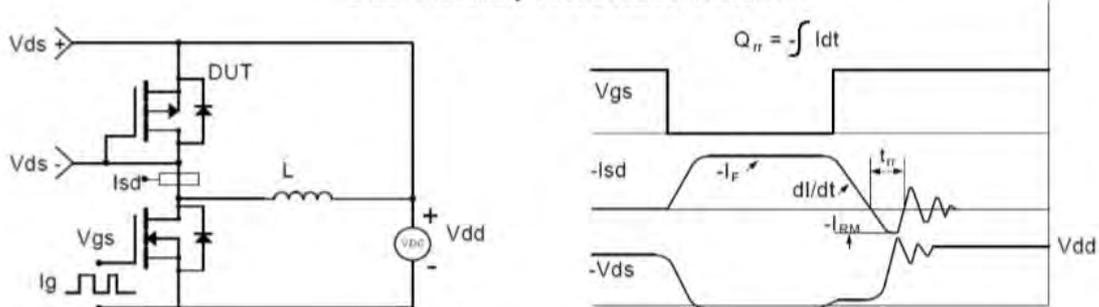


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

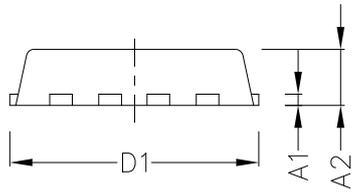


N And P-Channel Enhancement Mode Power MOSSFET
Gate Charge Test Circuit & Waveform

Resistive Switching Test Circuit & Waveforms

Unclamped Inductive Switching (UIS) Test Circuit & Waveforms

Diode Recovery Test Circuit & Waveforms


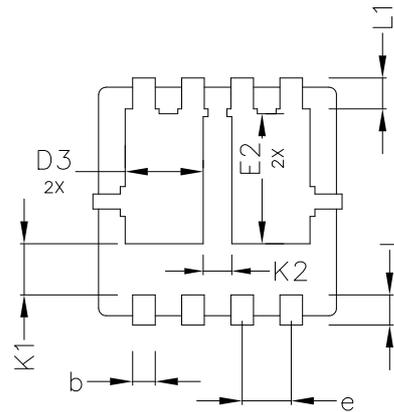


N And P-Channel Enhancement Mode Power MOSSFET

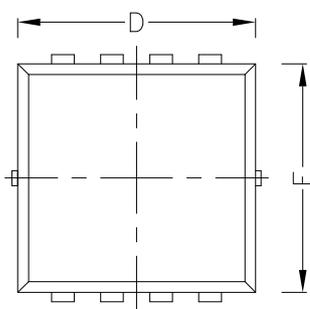
PDFN3333 Package Outline Dimensions (Units: mm)



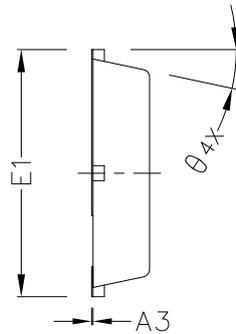
SIDE VIEW



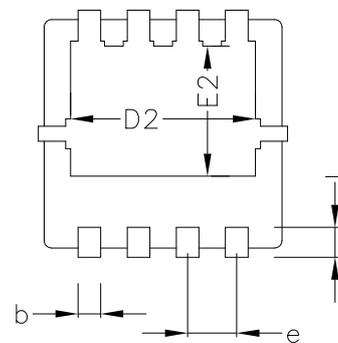
BOTTOM VIEW
OPTION 2



TOP VIEW



SIDE VIEW



BOTTOM VIEW
OPTION 1

COMMON DIMENSIONS (UNITS OF MEASURE IS mm)			
	MIN	NORMAL	MAX
A1	0.152 BSC		
A2	0.650	0.750	0.850
A3	0.005	—	0.020
b	0.250	0.300	0.350
D	3.050	3.150	3.250
D1	3.200	3.300	3.400
D2	2.350	2.450	2.550
D3	0.935	1.035	1.135
E1	3.150	3.300	3.450
E	2.950	3.050	3.150
E2	1.635	1.735	1.835
e	0.650 TYPE		
L	0.300	0.400	0.500
θ	12° TYPE		
K1	0.680 REF		
K2	0.380 REF		
L1	0.410 REF		