

Description

PECJ N And P-Channel Enhancement Mode MOSFET

Features

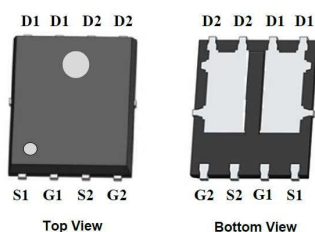
- N-Channel: 40V, 16A
 $R_{DS(ON)} < 22m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 31m\Omega @ V_{GS} = -4.5V$
- P-Channel: -40V, -16A
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -10V$
 $R_{DS(ON)} < 70m\Omega @ V_{GS} = -4.5V$
- Excellent Gate Charge x $R_{DS(ON)}$ Product(FOM)
- Very Low On-resistance $R_{DS(ON)}$
- Fast Switching Speed

Application

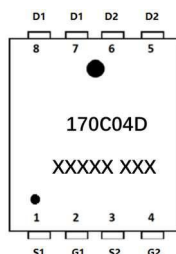
- Battery Protection
- Load Switch
- Power Management



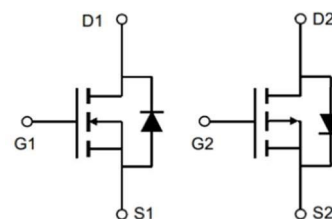
100% UIS TESTED!
100% ΔV_{ds} TESTED!



PDFN5X6-8L



Marking and pin Assignment



Schematic Diagram

Package Marking and Ordering Information

Device Marking	Device	OUTLINE	Device Package	Reel Size	Reel (PCS)	Per Carton (PCS)
G170C04D	PECJ170C04D	TAPING	PDFN5X6-8L	13inch	5000	-

Absolute Maximum Ratings ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Max. N-Channel	Max. P-Channel	Units
V_{DSS}	Drain-Source Voltage	40	-40	V
V_{GSS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current	$T_C = 25^\circ\text{C}$	-16	A
		$T_C = 100^\circ\text{C}$	-10	A
I_{DM}	Pulsed Drain Current ^{note1}	64	-64	A
E_{AS}	Single Pulsed Avalanche Energy ^{note2}	19	27.5	mJ
P_D	Power Dissipation	$T_C = 25^\circ\text{C}$	22	W
$R_{\theta JA}$	Thermal Resistance, Junction to Case	13	5.7	$^\circ\text{C/W}$
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +150		$^\circ\text{C}$

N-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =40V, V _{GS} =0V	-	-	1.0	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} =±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	1.0	1.5	2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} =10V, I _D =15A	-	16	22	mΩ
		V _{GS} =4.5V, I _D =10A	-	22	31	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =20V, V _{GS} =0V, f=1.0MHz	-	980	-	pF
C _{OSS}	Output Capacitance		-	86.2	-	pF
C _{rSS}	Reverse Transfer Capacitance		-	68.5	-	pF
Q _g	Total Gate Charge	V _{DS} =20V, I _D =8A, V _{GS} =10V	-	11	-	nC
Q _{gs}	Gate-Source Charge		-	1.9	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	2.2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DS} =20V, I _D = 16A, R _L =2.5Ω, R _{REN} =3Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	13	-	ns
t _{d(off)}	Turn-off Delay Time		-	36	-	ns
t _f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	16	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	64	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = 16A	-	-0.8	-1.2	V
t _{rr}	Body Diode Reverse Recovery Time	T _J =25℃,	-	19	-	ns
Q _{rr}	Body Diode Reverse Recovery	I _F =16A,dI/dt=100A/μs	-	11	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition : T_J=25°C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25Ω, I_{AS}=8.7A

T_J=25°C, V_{DD}=-30V, V_G= -10V, L=0.5mH, R_g=25Ω, I_{AS}= -10.5A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

P-Channel Electrical Characteristics (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -8A	-	40	52	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	50	70	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -20V, V _{GS} =0V, f=1.0MHz	-	1034	-	pF
C _{oss}	Output Capacitance		-	107	-	pF
C _{rss}	Reverse Transfer Capacitance		-	79.5	-	pF
Q _g	Total Gate Charge	V _{DS} = -20V, I _D = -8A, V _{GS} = -10V	-	20	-	nC
Q _{gs}	Gate-Source Charge		-	3.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -20V, I _D = -16A, V _{GS} = -10V, R _{GEN} =2.5Ω	-	8	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	23	-	ns
t _f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-16	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-64	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -16A	-	-0.8	-1.2	V
trr	Reverse Recovery Time	V _{GS} =0V, I _S =-16A, di/dt=100A/μs	-	29	-	ns
Qrr	Reverse Recovery Charge		-	20	-	nC

Typical Performance Characteristics-N

Figure1: Output Characteristics

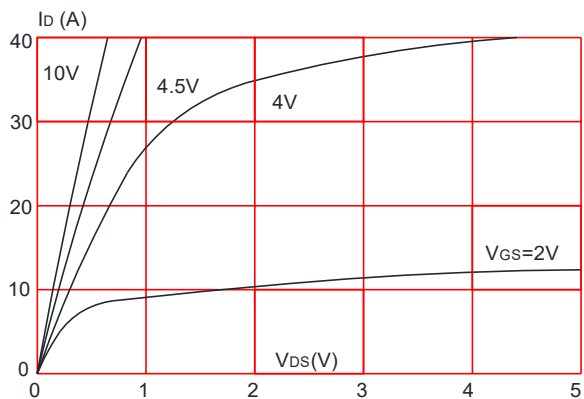


Figure 2: Typical Transfer Characteristics

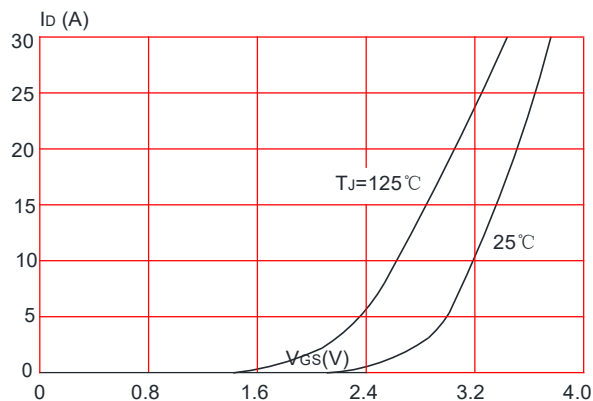


Figure 3: On-resistance vs. Drain Current

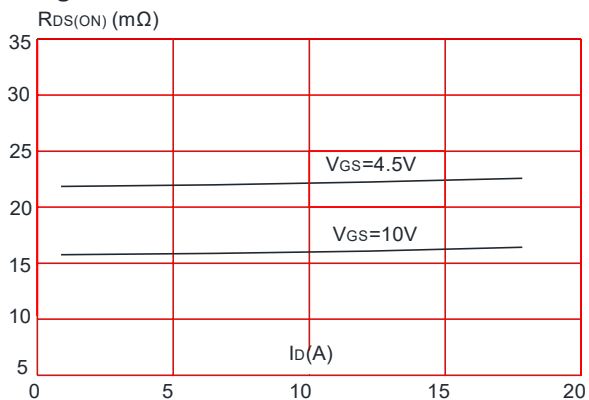


Figure 4: Body Diode Characteristics

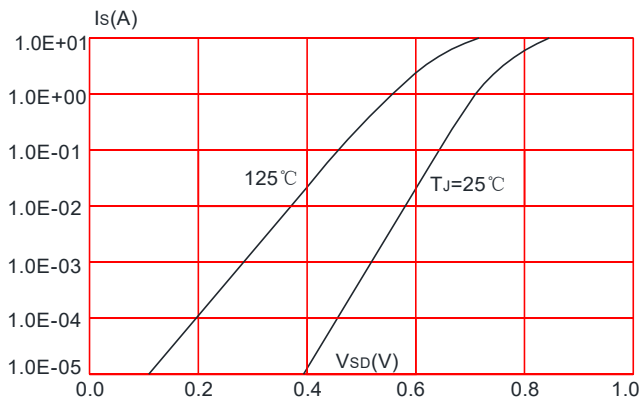


Figure 5: Gate Charge Characteristics

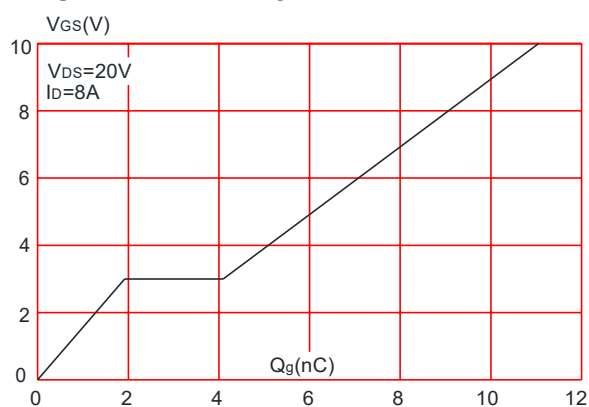


Figure 6: Capacitance Characteristics

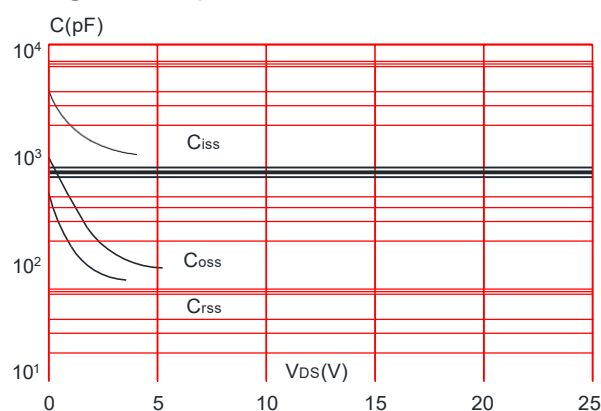


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

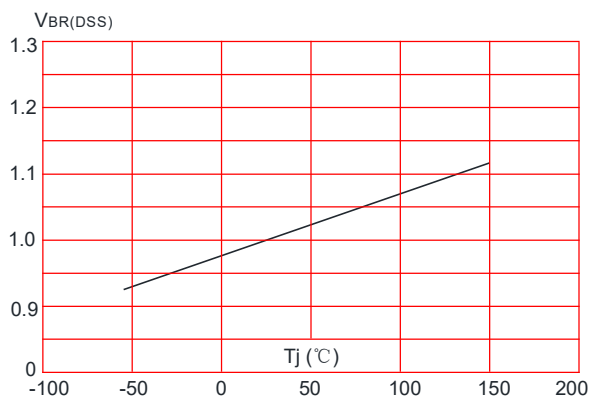


Figure 8: Normalized on Resistance vs. Junction Temperature

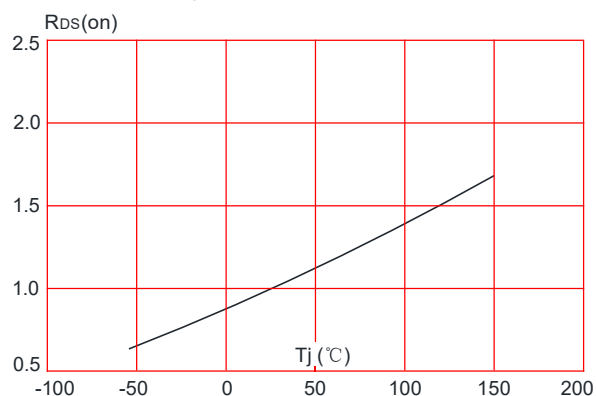


Figure 9: Maximum Safe Operating Area

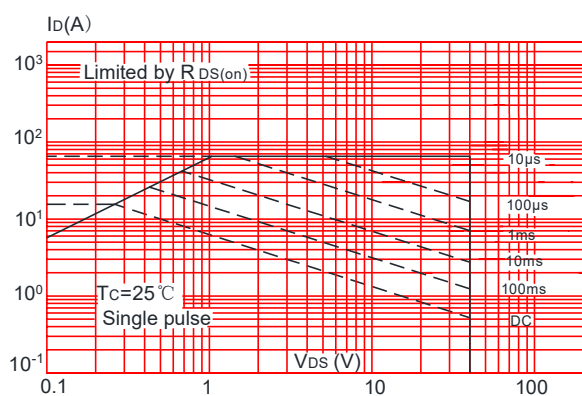


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

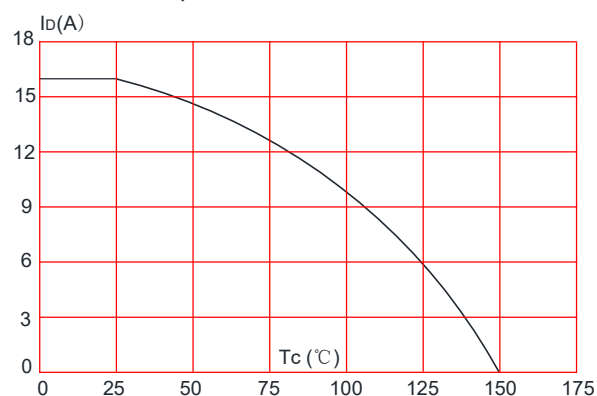
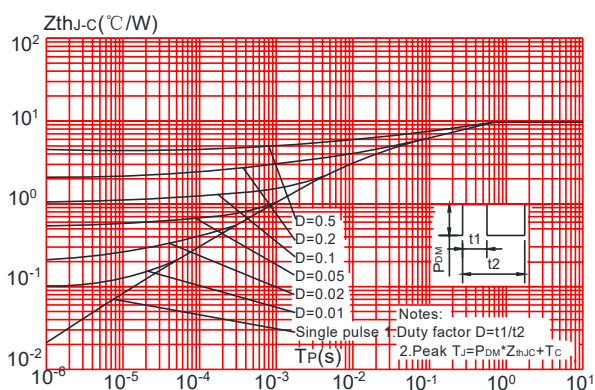


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit-N

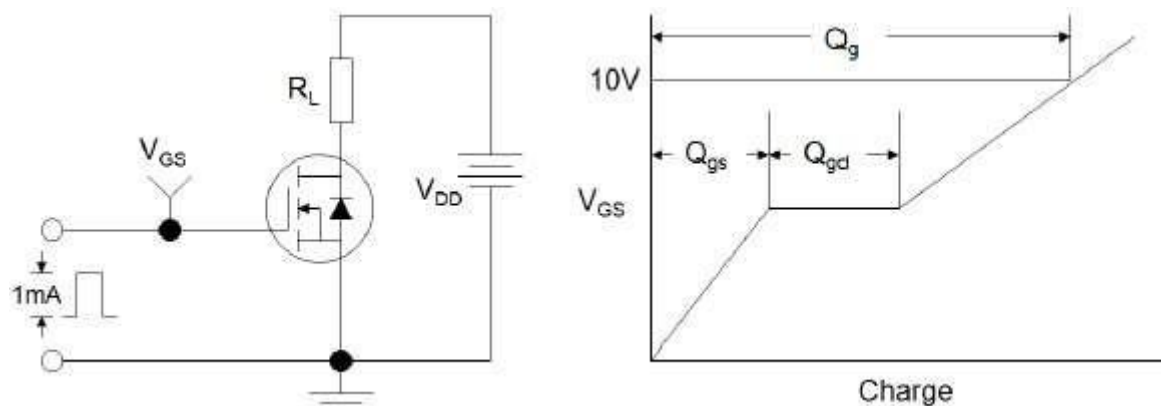


Figure1:Gate Charge Test Circuit & Waveform

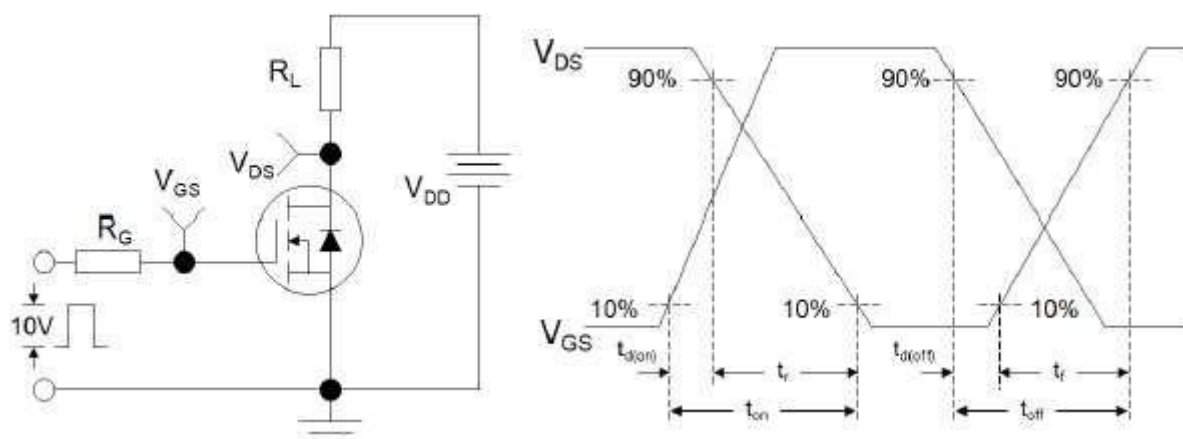


Figure 2: Resistive Switching Test Circuit & Waveforms

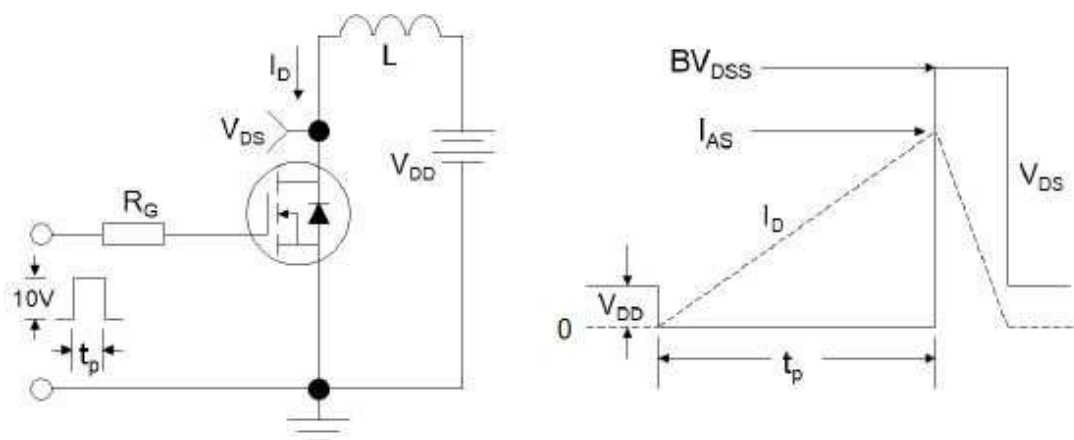


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Typical Performance Characteristics-P

Figure1: Output Characteristics

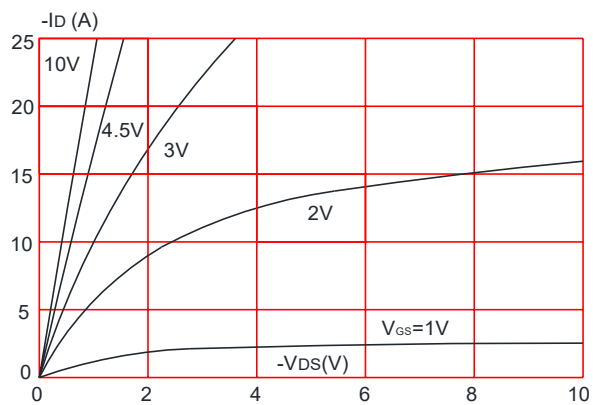


Figure 2: Typical Transfer Characteristics

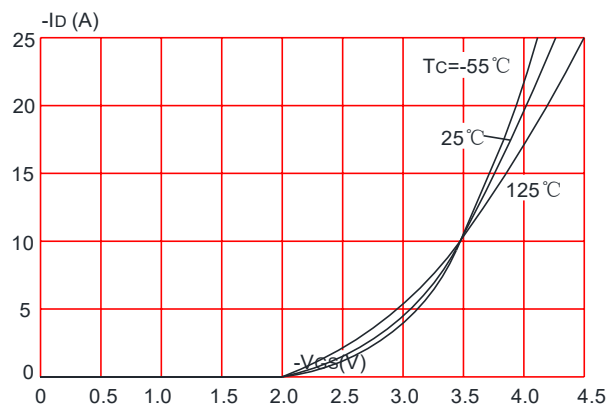


Figure 3: On-resistance vs. Drain Current

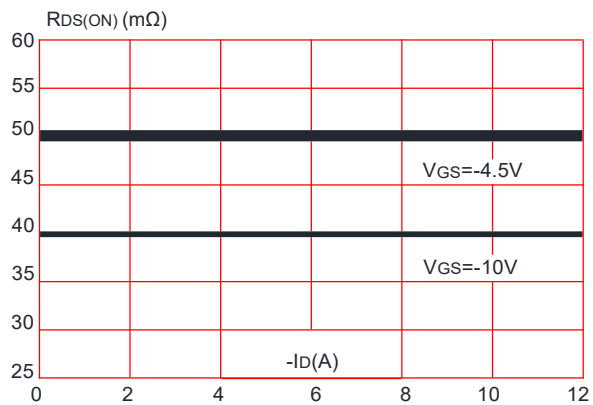


Figure 4: Body Diode Characteristics

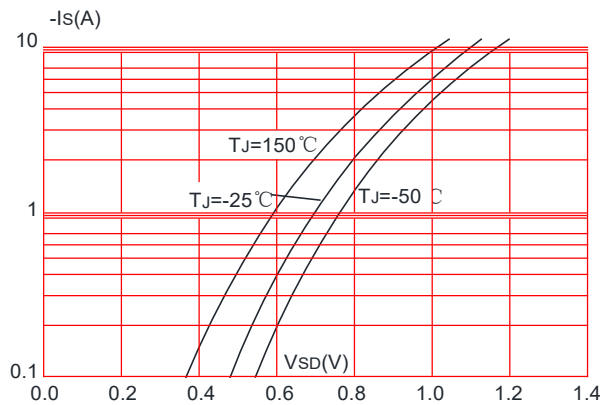


Figure 5: Gate Charge Characteristics

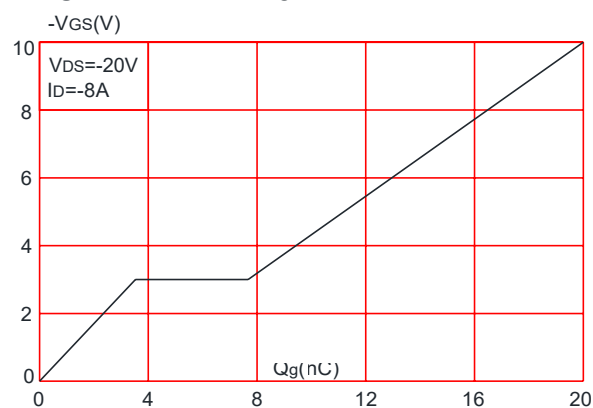


Figure 6: Capacitance Characteristics

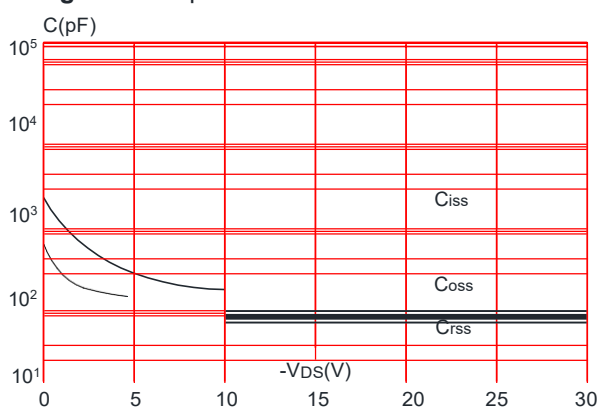


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

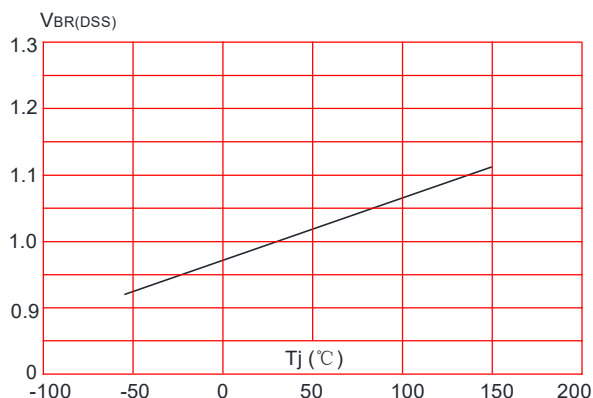


Figure 8: Normalized on Resistance vs. Junction Temperature

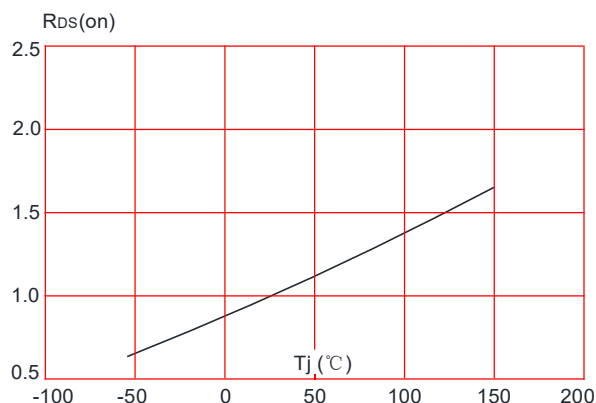


Figure 9: Maximum Safe Operating Area

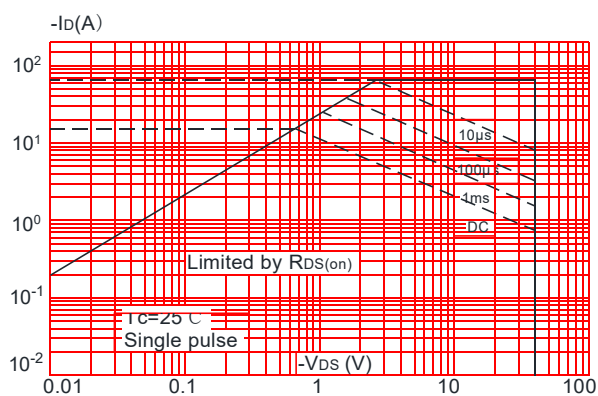


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

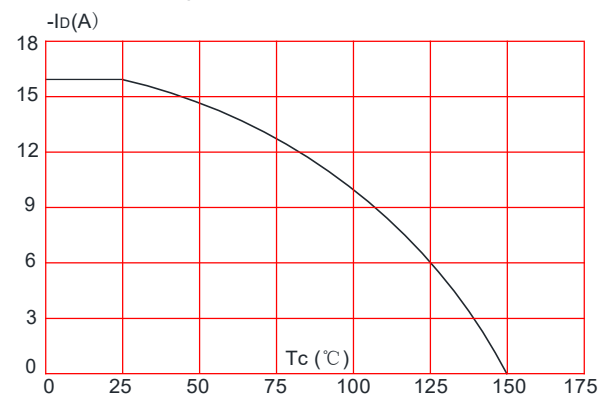
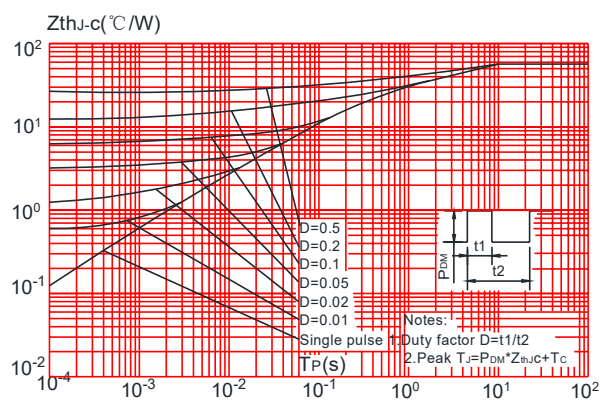
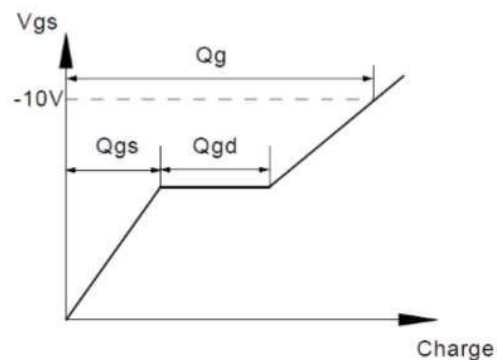
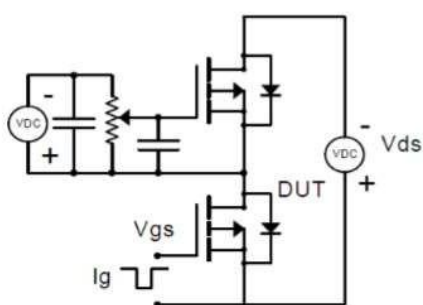


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

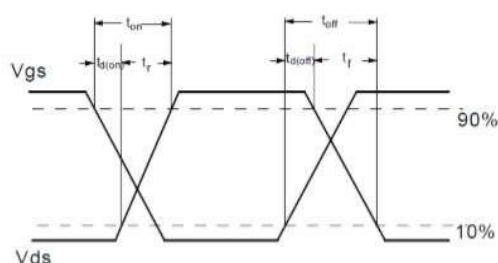
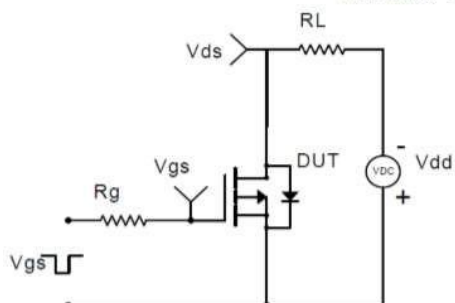


Test Circuit-P

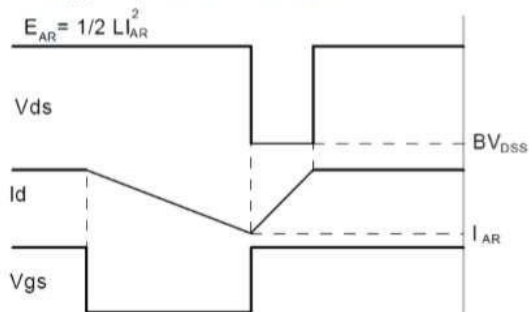
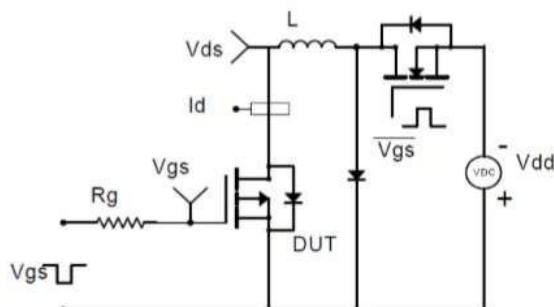
Gate Charge Test Circuit & Waveform



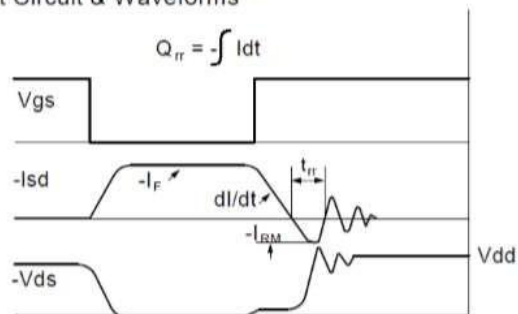
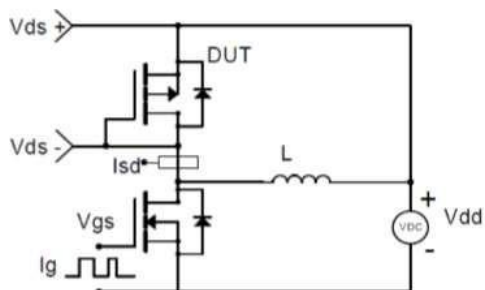
Resistive Switching Test Circuit & Waveforms



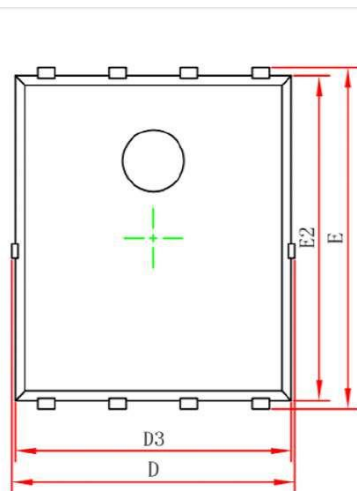
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



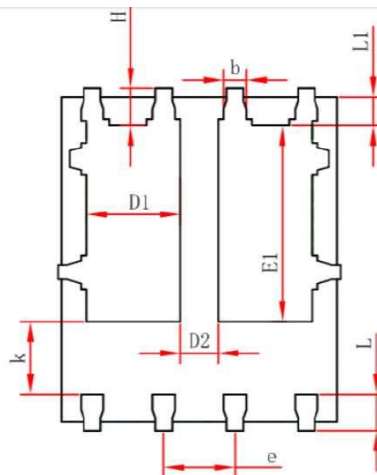
Diode Recovery Test Circuit & Waveforms



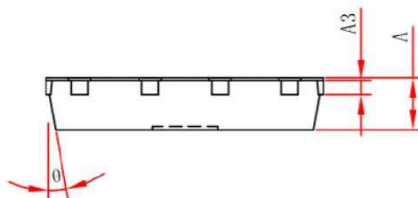
Package Mechanical Data- PDFN5X6-8L



Top View



Bottom View



Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.154REF.		0.006REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	1.470	1.870	0.058	0.074
D2	0.470	0.870	0.019	0.034
E1	3.375	3.575	0.133	0.141
D3	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°