AP60G02NF

20V N+P-Channel Enhancement Mode MOSFET

Description

The AP60G02NF uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

V_{DS} = 20V I_D =65A

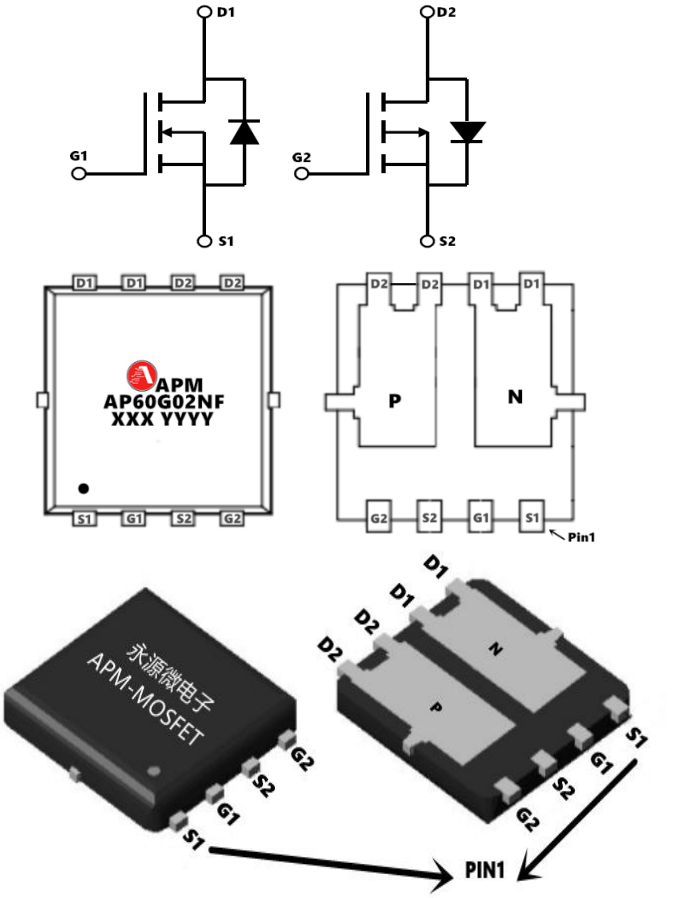
$R_{DS(ON)}$ < 6.5mΩ @ V_{GS}=4.5V（**Type：4.8mΩ**）

V_{DS} = -20V I_D =-62A

$R_{DS(ON)}$ < 8.5mΩ @ V_{GS}=-4.5V（**Type：6.8mΩ**）

Application

BLDC



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP60G02NF	PDFN5*6-8L	AP60G02NF XXX YYYY	5000

Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	N-Ch	P-Ch	Units
VDS	Drain-Source Voltage	20	-20	V
VGS	Gate-Source Voltage	±12	±12	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	65	-62	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	42.5	-37.5	A
IDM	Pulsed Drain Current[2]	243	-210	A
EAS	Single Pulse Avalanche Energy[3]	389	478	mJ
IAS	Avalanche Current	30	25	A
P_D@T_C=25℃	Total Power Dissipation[4]	46		W
TSTG	Storage Temperature Range	-55 to 150		℃
T_J	Operating Junction Temperature Range	-55 to 150		℃
$R_{\theta}JA$	Thermal Resistance Junction-Ambient [1]	25		℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	1.3		℃/W

N-Electrical Characteristics (T_C=25℃unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	VGS=0V, ID=250μA	20	24	-	V
IDSS	Zero Gate Voltage Drain Current	VDS=20V, VGS=0V,	-	-	1.0	μA
IGSS	Gate to Body Leakage Current	VDS=0V, VGS=±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS, ID=250μA	0.5	0.7	1.2	V
RDS(on)	Static Drain-Source on-Resistance note3	VGS=4.5V, ID=20A	-	4.8	6.5	mΩ
		VGS=2.5V, ID=15A	-	5.8	8.0	
Ciss	Input Capacitance	VDS=10V, VGS=0V, f = 1.0MHz	-	2500	-	pF
Coss	Output Capacitance		-	407	-	pF
Crss	Reverse Transfer Capacitance		-	386	-	pF
Qg	Total Gate Charge	VDS=10V, ID=30A, VGS=4.5V	-	32	-	nC
Qgs	Gate-Source Charge		-	3	-	nC
Qgd	Gate-Drain(“Miller”) Charge		-	11	-	nC
td(on)	Turn-on Delay Time	VDS=10V, ID=30A, RGEN=3Ω, VGS =4.5V	-	17	-	ns
tr	Turn-on Rise Time		-	49	-	ns
td(off)	Turn-off Delay Time		-	74	-	ns
tf	Turn-off Fall Time		-	26	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	75	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	300	A
VSD	Drain to Source Diode Forward Voltage	VGS = 0V, IS=30A	-	-	1.2	V

Note :

1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.
2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3、The power dissipation is limited by 150℃ junction temperature
4、EAS condition: TJ=25℃, VDD =16V,V GS =4.5V ,L=0.1mH，RG=25Ω，ID=30A
5、The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

P-Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
V(BR)DSS	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D= -250μA	-20	-	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V,	-	-	-1	μA
IGSS	Gate to Body Leakage Current	V_{DS} =0V, V_{GS} = ±12V	-	-	±100	nA
VGS(th)	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0.35	-0.65	-1.0	V
RDS(on)	Static Drain-Source on-Resistance note3	V_{GS} =-4.5V, I_D =-15A	-	6.8	8.5	mΩ
		V_{GS} =-2.5V, I_D =-12A	-	8.9	10	
C_{iss}	Input Capacitance	V_{DS} =-10V, V_{GS} =0V, f = 1.0MHz	-	4590	-	pF
Coss	Output Capacitance		-	505	-	pF
Crss	Reverse Transfer Capacitance		-	440	-	pF
Q_g	Total Gate Charge	V_{DS} =-10V, I_D =-15A, V_{GS} =-4.5V	-	46	-	nC
Q_{gs}	Gate-Source Charge		-	7.3	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	10	-	nC
td(on)	Turn-on Delay Time	V_{DD} =-10V, I_D =-14A, R_{GEN}=2.7Ω, V_{GS} =-10V	-	8	-	ns
t_r	Turn-on Rise Time		-	59	-	ns
td(off)	Turn-off Delay Time		-	111	-	ns
t_f	Turn-off Fall Time		-	43	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	-60	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-240	A
VSD	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S =-20A	-	-	-1.2	V
trr	Reverse Recovery Time	T_J=25℃,I_{SD}=-15A, V_{GS}=0V di/dt=-100A/μs	-	18	-	ns
Qrr	Reverse Recovery Charge		-	7.7	-	nC

Note :

1、The data tested by surface mounted on a 1 inch 2 FR-4 board with 2OZ copper.

2、The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3、The power dissipation is limited by 150℃ junction temperature

4、EAS condition: TJ=25℃, VDD =-16V,V GS =-4.5V ,L=0.1mH，RG=25Ω，ID=25A

5、The data is theoretically the same as I D and I DM , in real applications , should be limited by total power dissipation.

N-Typical Characteristics

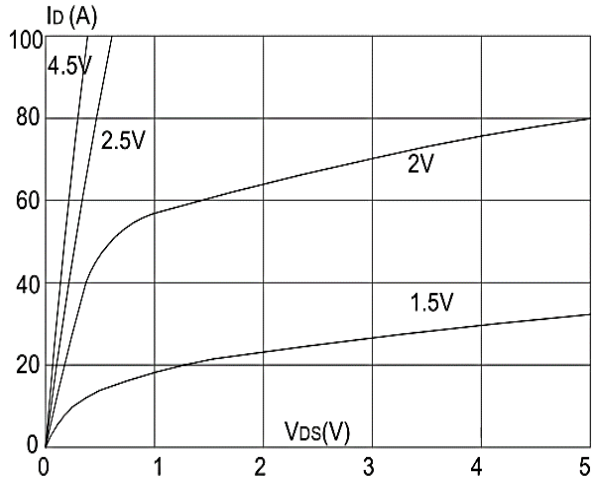


Figure1: Output Characteristics

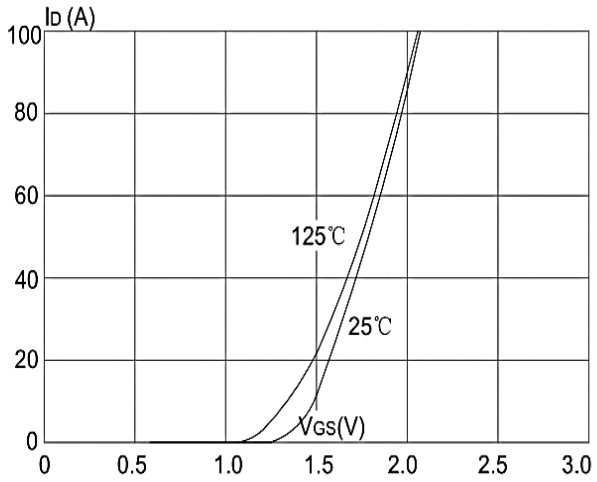


Figure 2: Typical Transfer Characteristics

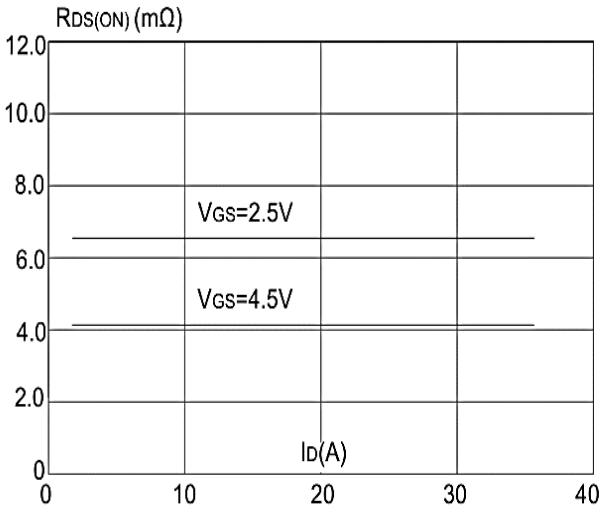


Figure 3:On-resistance vs. Drain Current

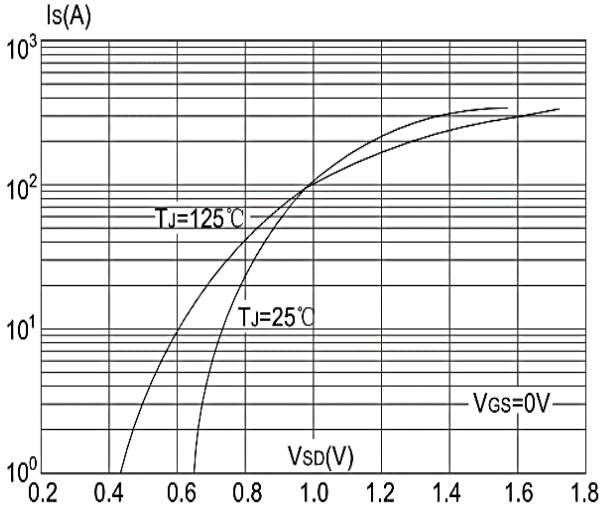


Figure 4: Body Diode Characteristics

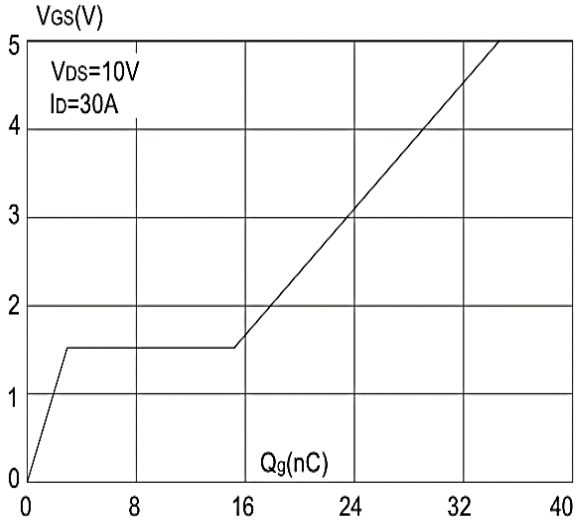


Figure 5: Gate Charge Characteristics

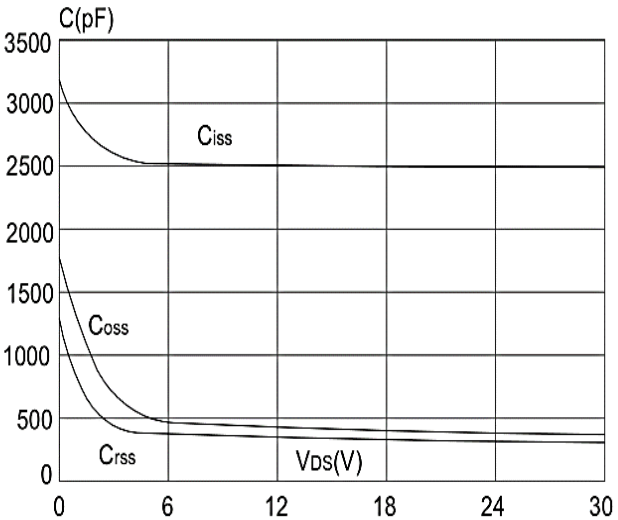


Figure 6: Capacitance Characteristics

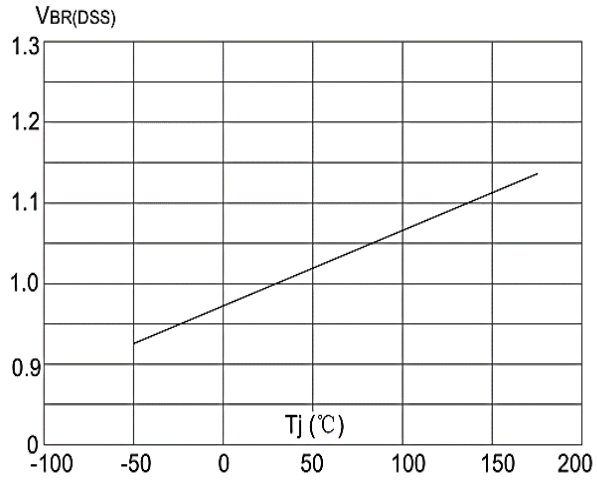


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

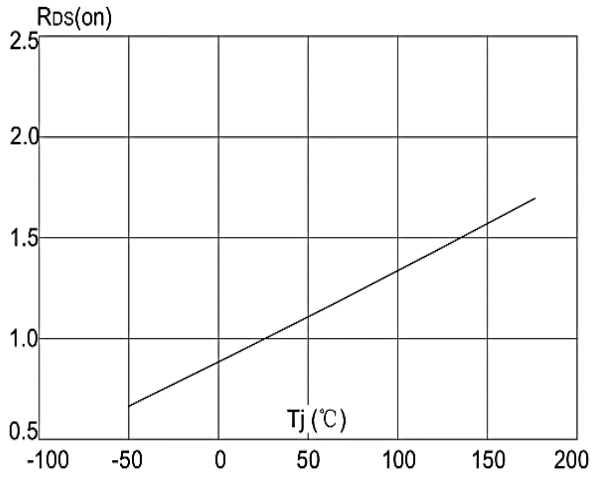


Figure 8: Normalized on Resistance vs Junction Temperature

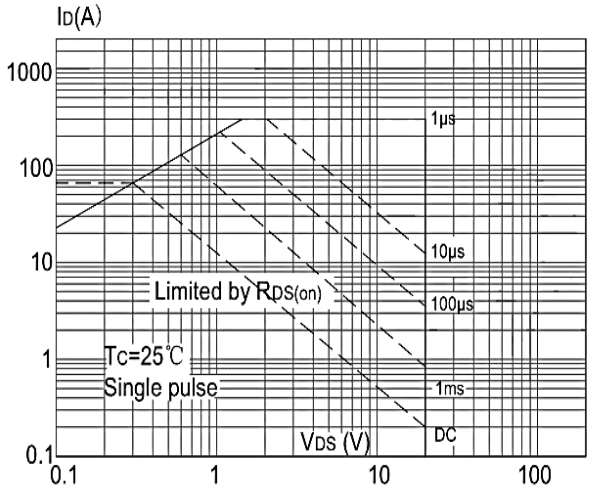


Figure 9: Maximum Safe Operating Area vs. Case Temperature

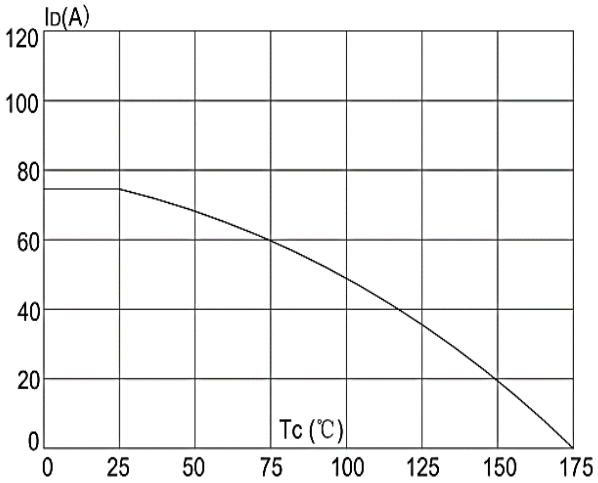


Figure 10: Maximum Continuous Drain Current

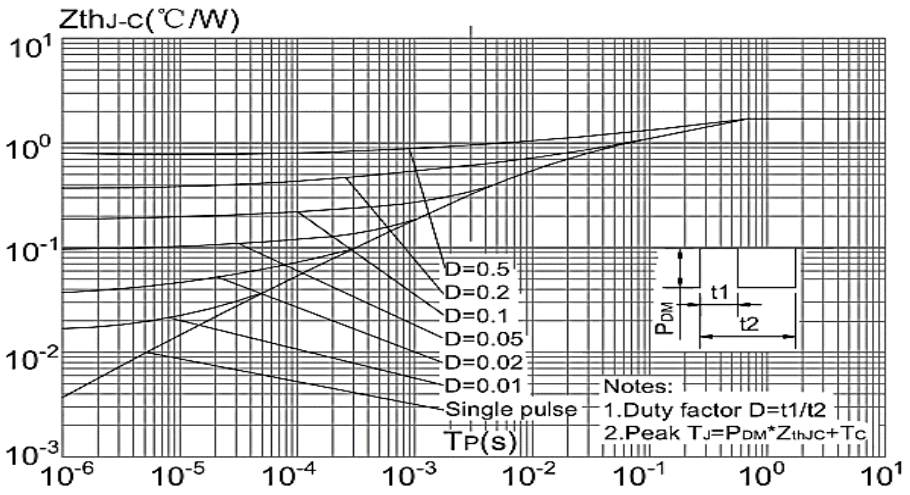


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Typical Characteristics

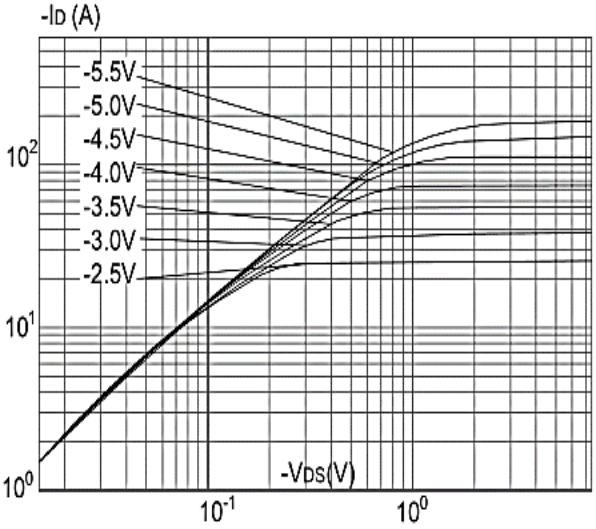


Figure1: Output Characteristics

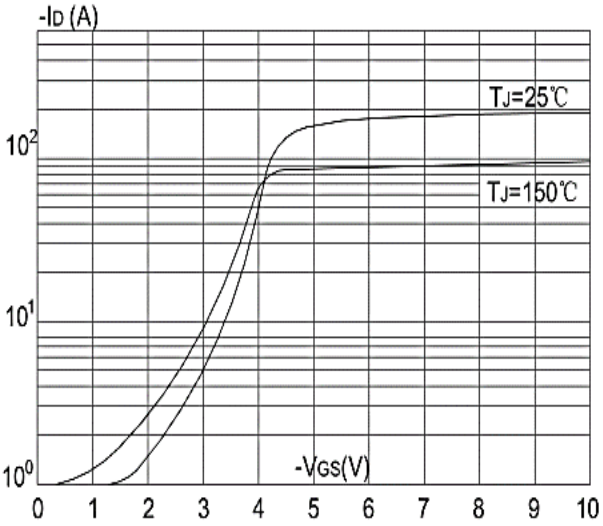


Figure 2: Typical Transfer Characteristics

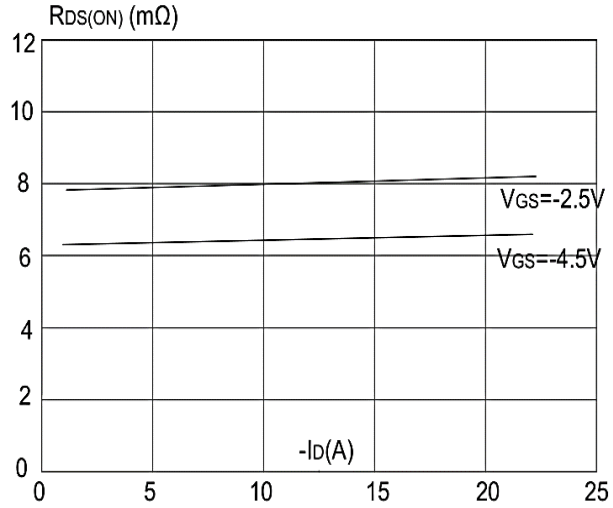


Figure 3:On-resistance vs. Drain Current

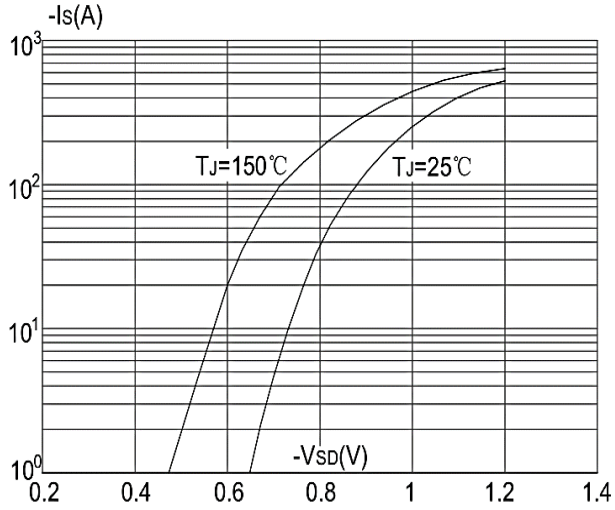


Figure 4: Body Diode Characteristics

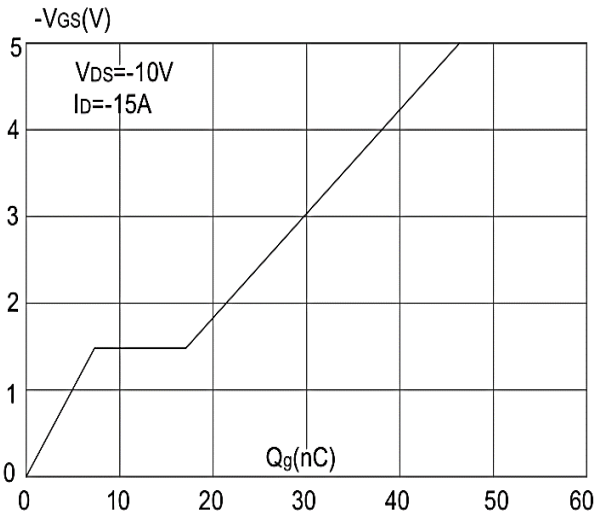


Figure 5: Gate Charge Characteristics

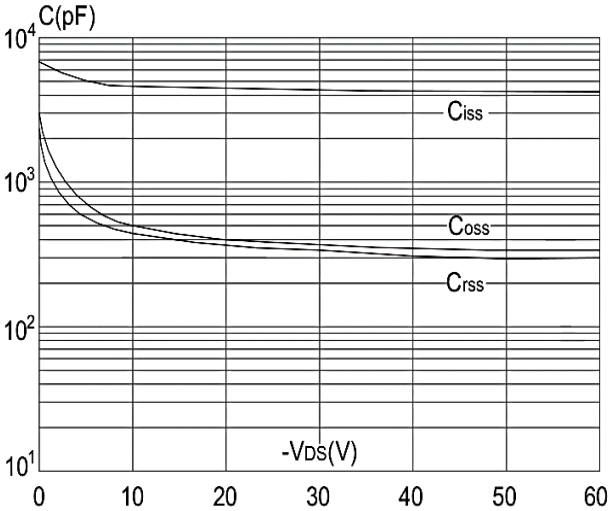


Figure 6: Capacitance Characteristics

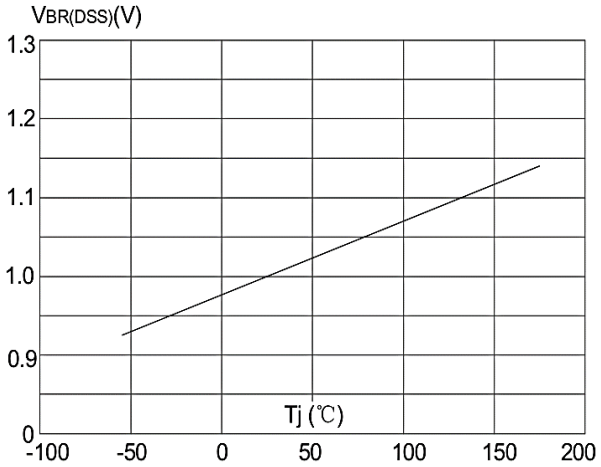


Figure 7: Normalized Breakdown Voltage vs Junction Temperature

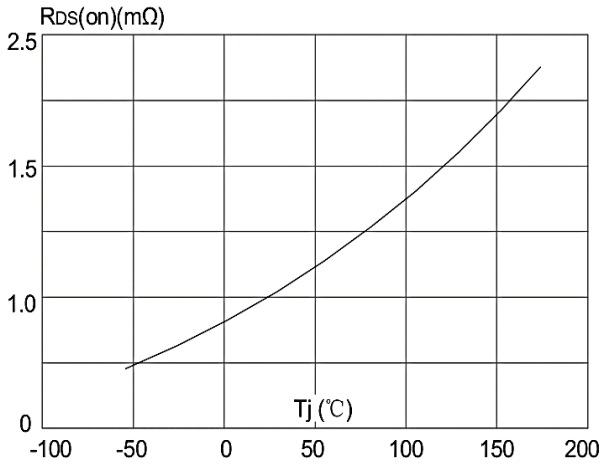


Figure 8: Normalized on Resistance vs. Junction Temperature

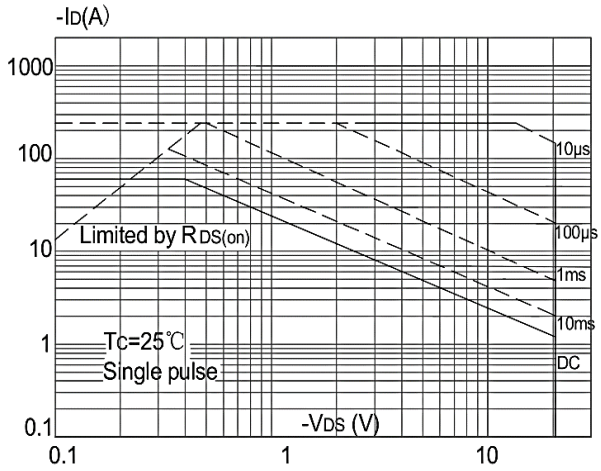


Figure 9: Maximum Safe Operating Area vs. Ambient Temperature

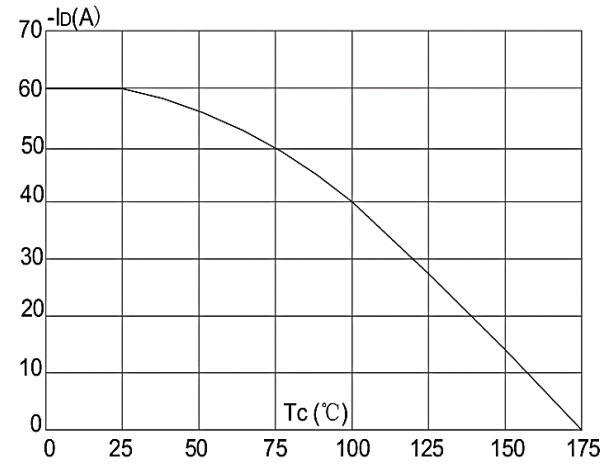


Figure 10: Maximum Continuous Drain Current

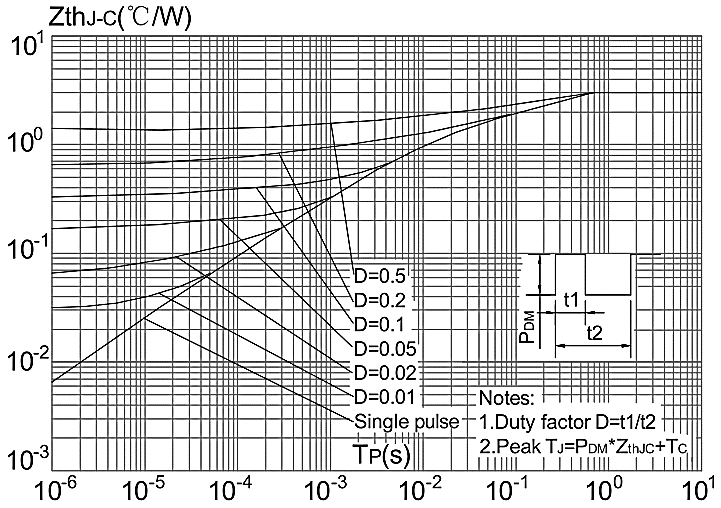
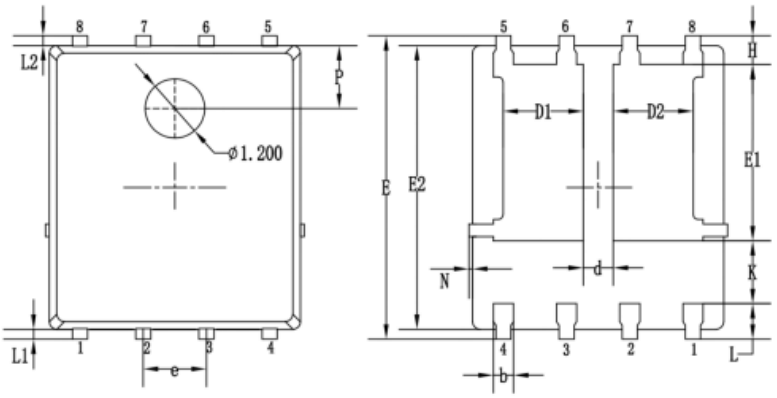
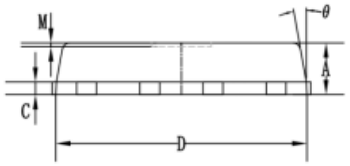


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambien

Package Mechanical Data-PDFN5X6-8L





Symbol	Dim in mm		
	min	typ	max
A	0.9	1.05	1.2
b	0.3	0.4	0.5
C	0.2	0.25	0.35
D	4.9	5.05	5.2
D1/D2	1.51	1.66	1.81
E	5.9	6.1	6.3
E1	3.3	3.5	3.7
E2	5.6	5.75	5.9
e	1.27BSC		
H	0.48	0.58	0.7
K	1.14	1.27	1.4
L	0.54	0.74	0.84
L1/L2	0.1	0.2	0.3
θ	8°	10°	12°
M	0.08REF		
N	0		0.15
P	1.28REF		
d	0.5	0.6	0.7

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Edition	Date	Change
REV1.0	2024/3/29	Initial release