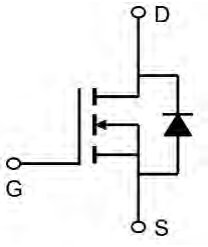
LM5D25PN02

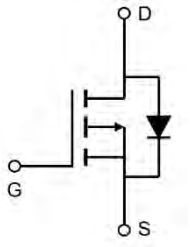
20V N+P-Channel Enhancement Mode MOSFET

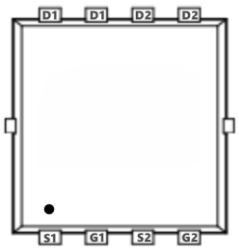
Description

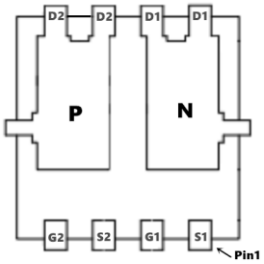
The LM5D25PN02 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a

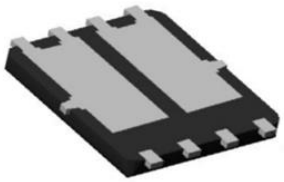
Battery protection or in other Switching application.











General Features

V_{DS} = 20V I_D =32A

$R_{DS(ON)}$ < 10mΩ @ V_{GS}=4.5V

V_{DS} = -20V I_D =-26.8A

$R_{DS(ON)}$ < 20mΩ @ V_{GS}=-4.5V

Application

Wireless charging

Boost driver

Brushless motor

Package Marking and Ordering Information

Device	Device Marking	Device Package	Reel Size	Tape width	Quantity
LM5D25PN02	AP25G02NF	DFN5X6-8	-	-	5000 units

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

Symbol	Parameter	N-Ch	P-Ch	Units
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	32	26.8	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	27.4	-22.5	A
I_{DM}	Pulsed Drain Current[2]	78	-69.1	A
EAS	Single Pulse Avalanche Energy[3]	150	135	mJ
I_{AS}	Avalanche Current	72	68	A
P_D@T_C=25℃	Total Power Dissipation[4]	46	41.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	62		℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	5		℃/W

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	23	-	V
IDSS	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V,	-	-	1.0	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	0.58	0.65	1.2	V
RDS(on)	Static Drain-Source on-Resistance note3	V_{GS}=4.5V, I_D=25A	-	7.7	10	mΩ
		V_{GS}=2.5V, I_D=10A	-	10	13	
C_{iss}	Input Capacitance	V_{DS}=10V, V_{GS}=0V, f=1.0MHz	-	1458	-	pF
Coss	Output Capacitance		-	238	-	pF
Crss	Reverse Transfer Capacitance		-	212	-	pF
Q_g	Total Gate Charge	V_{DS}=10V, I_D=25A, V_{GS}=4.5V	-	19	-	nC
Q_{gs}	Gate-Source Charge		-	3	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	6.4	-	nC
td(on)	Turn-on Delay Time	V_{DS}=10V, I_D=10A, R_{GEN}=3Ω, V_{GS}=4.5V	-	10	-	ns
t_r	Turn-on Rise Time		-	21	-	ns
td(off)	Turn-off Delay Time		-	39	-	ns
t_f	Turn-off Fall Time		-	19	-	ns
IS	Maximum Continuous Drain to Source Diode Forward Current		-	-	50	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	200	A
VSD	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S=30A	-	-	1.2	V
trr	Body Diode Reverse Recovery Time	IF=20A,dI/dt=100A/μs	-	25	-	ns
Qrr	Body Diode Reverse Recovery Charge		-	20	-	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 EAS data shows Max. rating . The test condition is V_{DD}=16V,V_{GS}=10V,L=0.1mH,I_{AS}=21A

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

5、The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

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	-22	-	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	-0.58	-0.7	-1.2	V
RDS(on)	Static Drain-Source on-Resistance note2	V_{GS}= -4.5V, I_D= -10A	-	16.8	20	mΩ
		V_{GS}= -2.5V, I_D= -5A	-	21.5	25	
C_{iss}	Input Capacitance	V_{DS}= -10V, V_{GS}=0V, f=1.0MHz	-	2000	-	pF
Coss	Output Capacitance		-	242	-	pF
Crss	Reverse Transfer Capacitance		-	231	-	pF
Q_g	Total Gate Charge	V_{DS}= -10V, I_D= -6A, V_{GS}= -4.5V	-	15.3	-	nC
Q_{gs}	Gate-Source Charge		-	2.2	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	4.4	-	nC
td(on)	Turn-on Delay Time	V_{DD} = -10V, I_D= -12A, V_{GS}= -4.5V, R_{GEN}=2.5Ω	-	10	-	ns
t_r	Turn-on Rise Time		-	31	-	ns
td(off)	Turn-off Delay Time		-	28	-	ns
t_f	Turn-off Fall Time		-	8	-	ns
IS	Maximum Continuous Drain to Source Diode ForwardCurrent		-	-	-12	A
ISM	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-48	A
VSD	Drain to Source Diode Forward Voltage	V_{GS}=0V, I_S= -12A	-	-0.8	-1.2	V

Note :

1、The data tested by surface mo unted 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 EAS data shows Max. rating . The test condition is V^{DD}=-16V,V^{GS}=-10V,L=0.1mH,I^{AS}=-21A

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

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

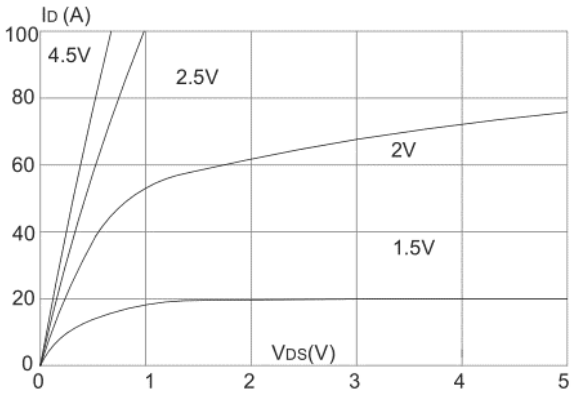


Figure1: Output Characteristics

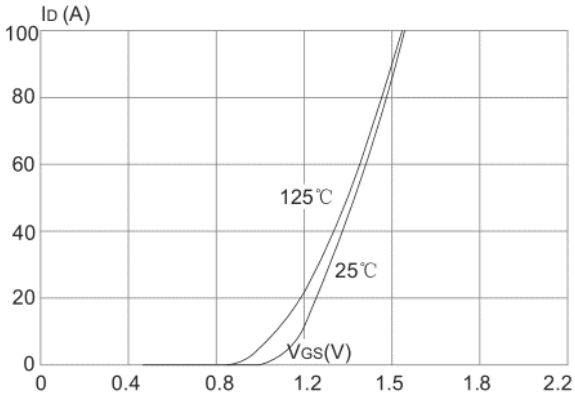


Figure 2: Typical Transfer Characteristics

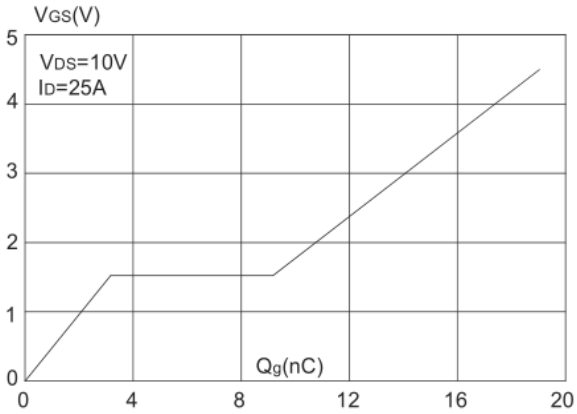


Figure 3: On-resistance vs. Drain Current

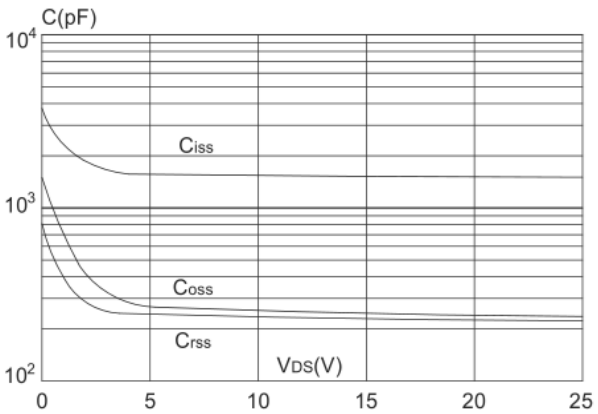


Figure 4: Body Diode Characteristics

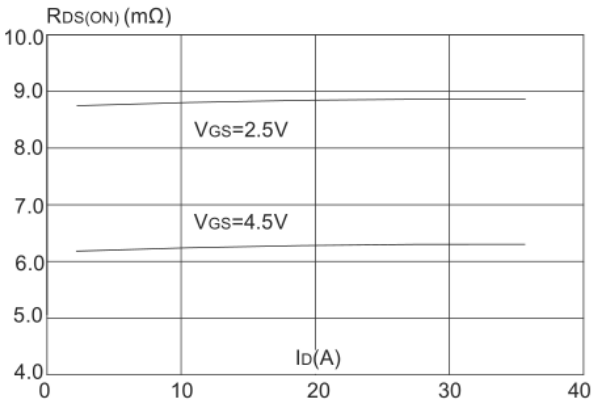


Figure 5: Gate Charge Characteristics

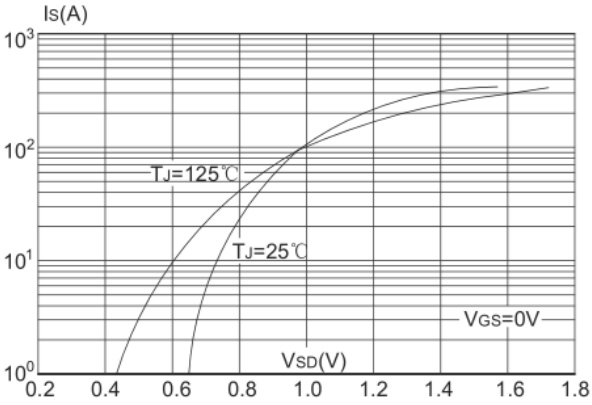


Figure 6: Capacitance Characteristics

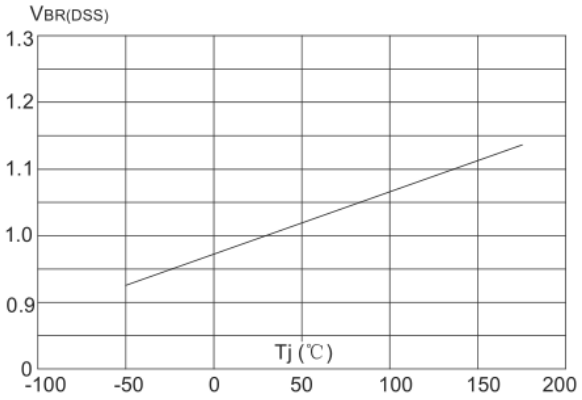


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

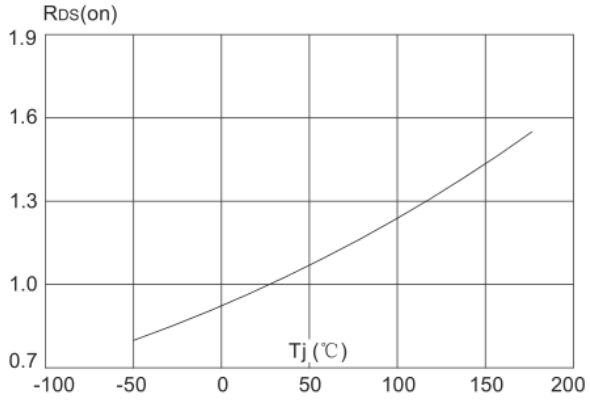


Figure 8: Normalized on Resistance vs. Junction Temperature

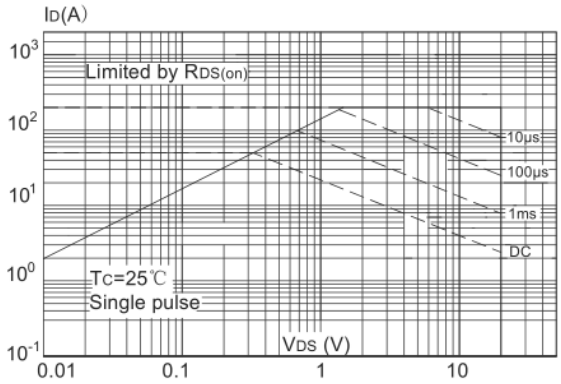


Figure 9: Maximum Safe Operating Area

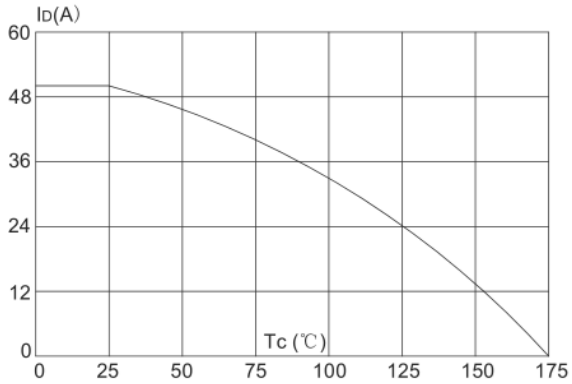


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

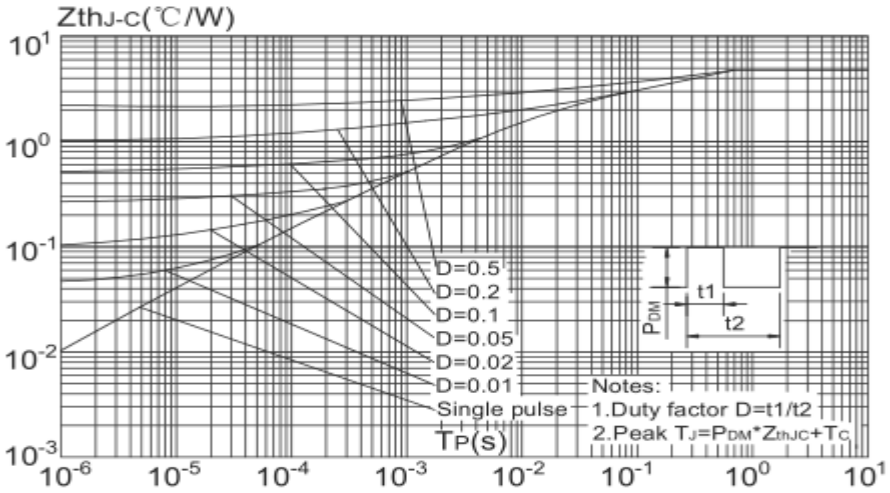


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

P-Typical Characteristics

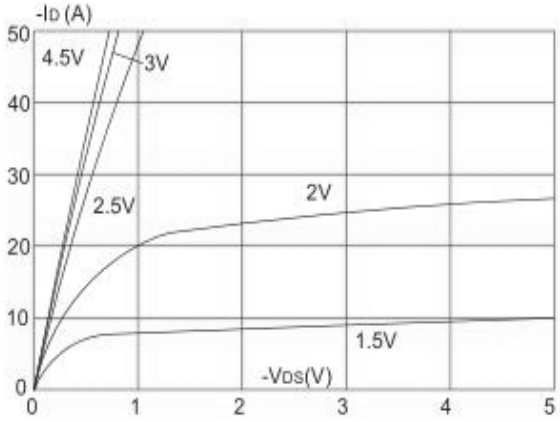


Figure1: Output Characteristics

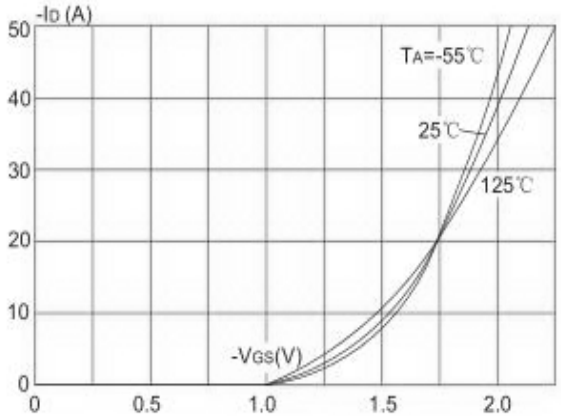


Figure 2: Typical Transfer Characteristics

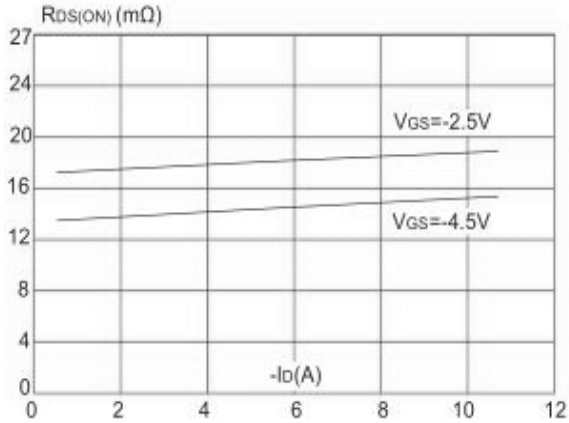


Figure 3: On-resistance vs. Drain Current

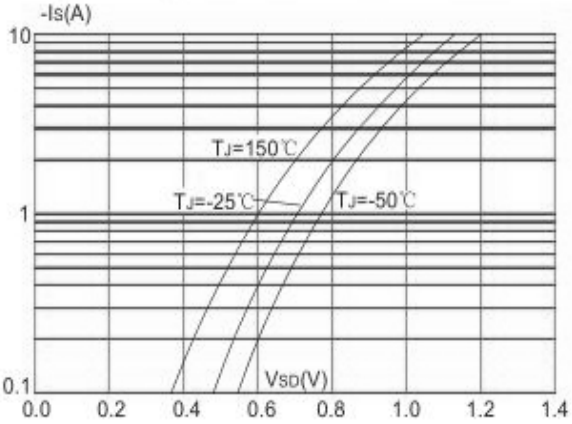


Figure 4: Body Diode Characteristics

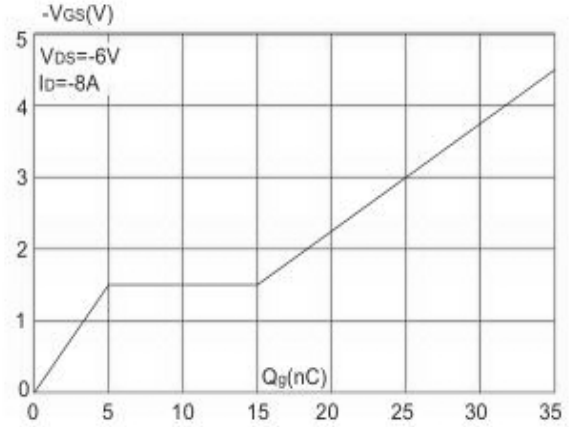


Figure 5: Gate Charge Characteristics

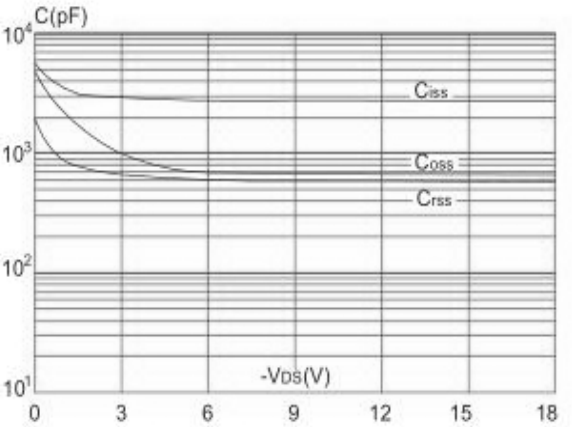


Figure 6: Capacitance Characteristics

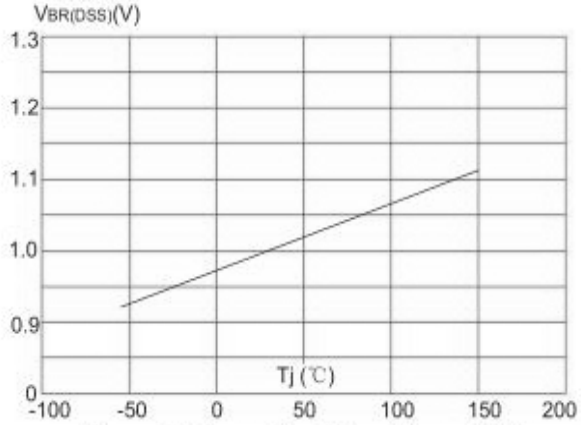


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

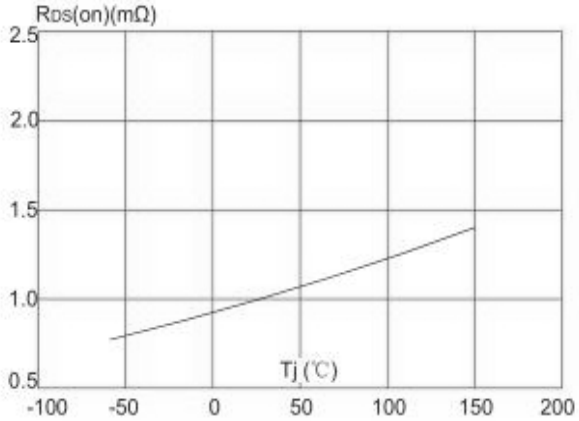
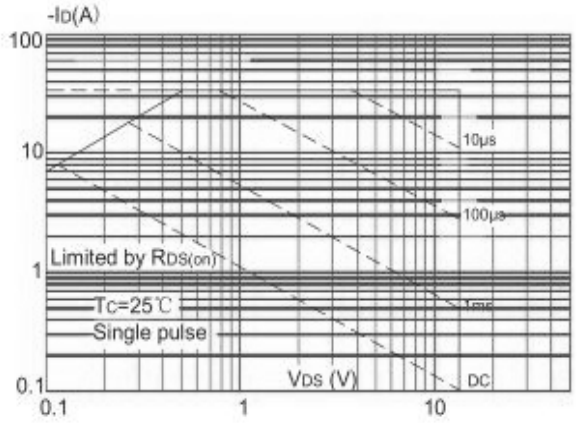


Figure 8: Normalized on Resistance vs. Junction Temperature



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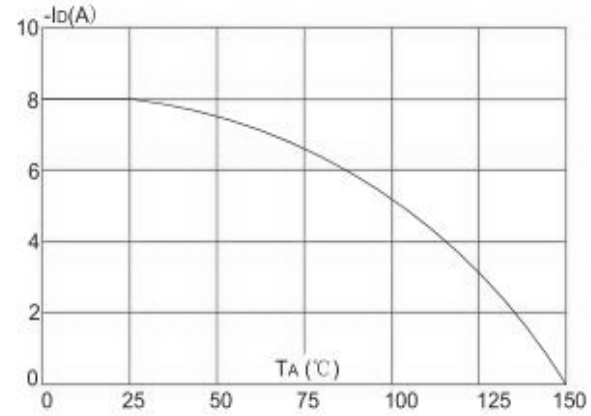


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

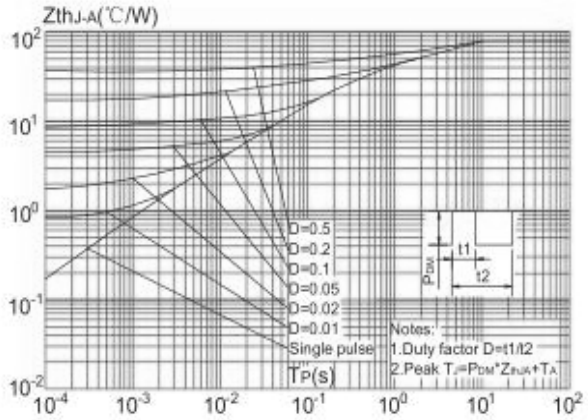
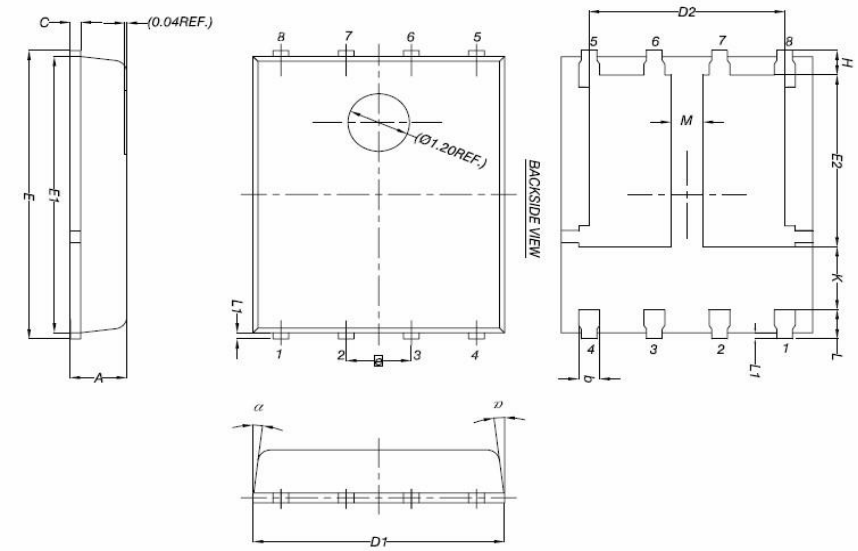


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

Package Mechanical Data-DFN5*6-8-JQ Double



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.90	1.00	1.10
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96
E	5.90	6.00	6.10
E1	5.66	5.76	5.83
E2	3.37	3.47	3.58
e	1.27BSC		
H	0.41	0.51	0.61
K	1.10	--	--
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
M	0.50	--	--
a	0°	--	12°

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