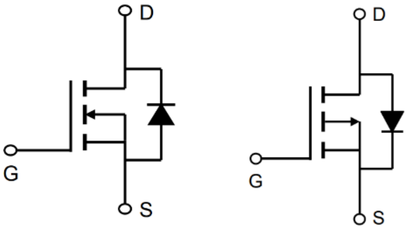
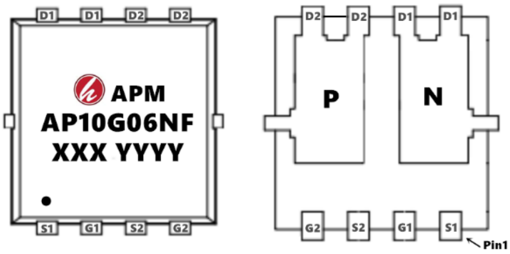
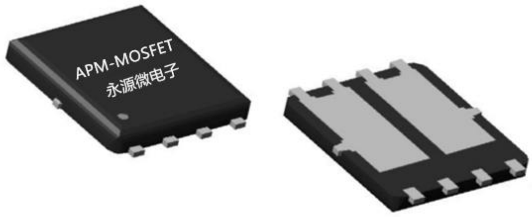
AP10G06NF

60V N+P-Channel Enhancement Mode MOSFET







Description

The AP10G006NFuses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

V_{DS} = 60V I_D =10A

$R_{DS(ON)}$ < 40mΩ @ V_{GS}=10V

V_{DS} = -60V I_D =9.5A

$R_{DS(ON)}$ < 70mΩ @ V_{GS}=10V

Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP10G06NF	PDFN5*6-8L	AP10G06NF XXXX YYYY	5000

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

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
VDS	Drain-Source Voltage	60	-60	V
VGS	Gate-Source Voltage	±20	±20	V
I_D@T_A=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	10	-9.5	A
I_D@T_A=70℃	Continuous Drain Current, V_{GS} @ 10V[1]	5.2	-4.3	A
IDM	Pulsed Drain Current[2]	30	-27	A
EAS	Single Pulse Avalanche Energy[3]	25.5	35.3	mJ
IAS	Avalanche Current	22.6	-26.6	A
P_D@T_A=25℃	Total Power Dissipation[4]	1.5	1.5	W
TSTG	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]	85	85	℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	36	36	℃/W

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

Symbol	Parameter	Conditions	Min	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	66	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.063	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=4A	---	35	40	mΩ
		V_{GS}=4.5V , I_D=2A	---	38	45	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.6	2.5	V
$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.24	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=4A	---	21	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	3.2	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=48V , V_{GS}=4.5V , I_D=4A	---	12.6	---	nC
Qgs	Gate-Source Charge		---	3.2	---	
Qgd	Gate-Drain Charge		---	6.3	---	
Td(on)	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=3.3Ω, I_D=4A	---	8	---	ns
T_r	Rise Time		---	14.2	---	
Td(off)	Turn-Off Delay Time		---	24.4	---	
T_f	Fall Time		---	4.6	---	
Ciss	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	1378	---	pF
Coss	Output Capacitance		---	86	---	
Crss	Reverse Transfer Capacitance		---	64	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	4.8	A
ISM	Pulsed Source Current[2,5]		---	---	9.6	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	V

Note :

1.The data tested by surface mounted on a 1 inch2 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 VDD=-25V,VGS=-10V,L=0.1mH,IAS=-26.6A

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

5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	-66	---	V
△BVDSS/△TJ	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.03	---	V/℃
RDS(ON)	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-3A	---	55	70	mΩ
		V_{GS}=-4.5V , I_D=-2A	---	75	105	
VGS(th)	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.2	-1.5	-2.5	V
$V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.56	---	mV/℃
IDSS	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=55℃	---	---	5	
IGSS	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-3A	---	15	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	13.5	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-48V , V_{GS}=-4.5V , I_D=-3A	---	9.86	---	nC
Qgs	Gate-Source Charge		---	3.1	---	
Qgd	Gate-Drain Charge		---	2.95	---	
Td(on)	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V R_G=3.3Ω, I_D=-1A	---	28.8	---	ns
T_r	Rise Time		---	19.8	---	
Td(off)	Turn-Off Delay Time		---	60.8	---	
T_f	Fall Time		---	7.2	---	
Ciss	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	1447	---	pF
Coss	Output Capacitance		---	97.3	---	
Crss	Reverse Transfer Capacitance		---	70	---	
IS	Continuous Source Current[1,5]	V_G=V_D=0V , Force Current	---	---	-3.7	A
ISM	Pulsed Source Current[2,5]		---	---	-7.5	A
VSD	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

Note :

1.The data tested by surface mounted on a 1 inch2 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 VDD=25V,VGS=10V,L=0.1mH,IAS=22.6A

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

5.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation

N-Channel Typical Characteristics

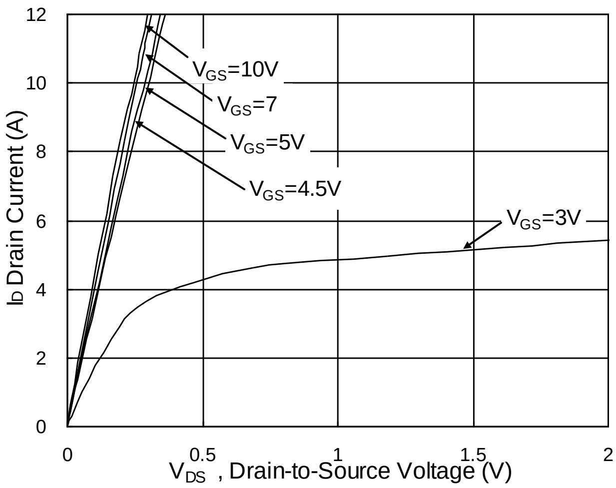


Fig.1 Typical Output Characteristics

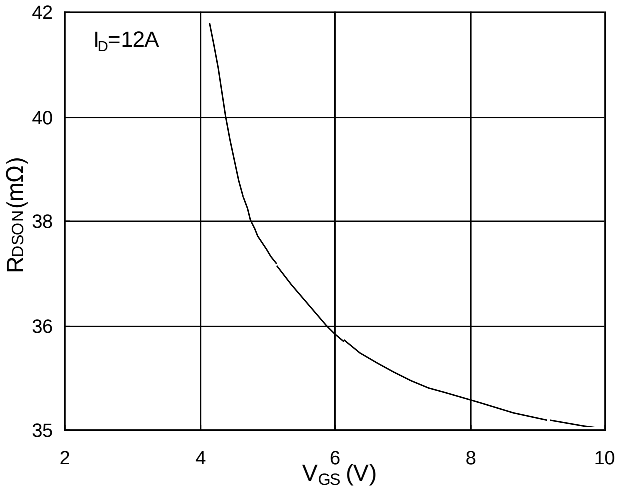


Fig.2 On-Resistance v.s Gate-Source

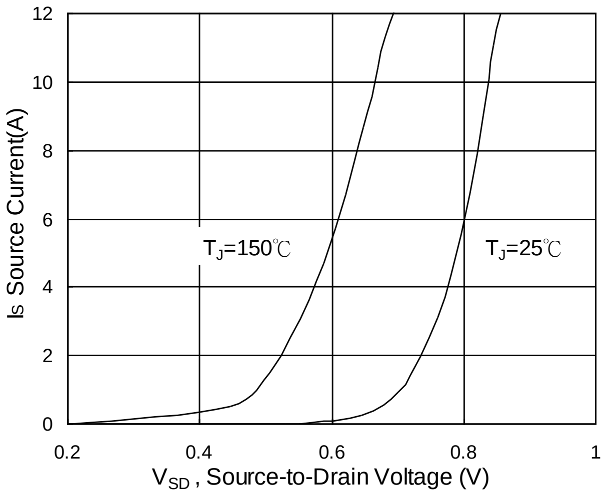


Fig.3 Forward Characteristics of Reverse

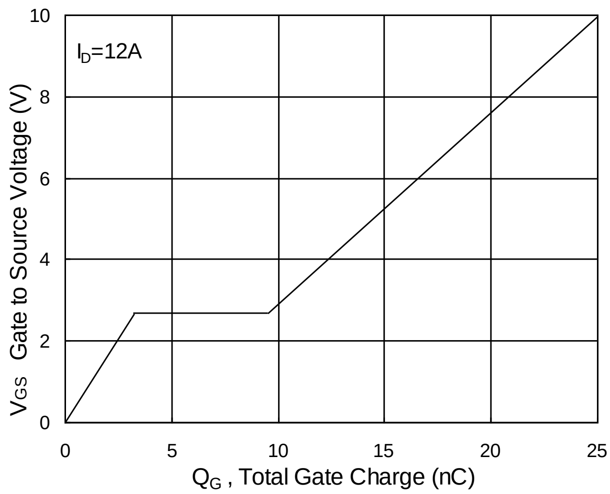


Fig.4 Gate-Charge Characteristics

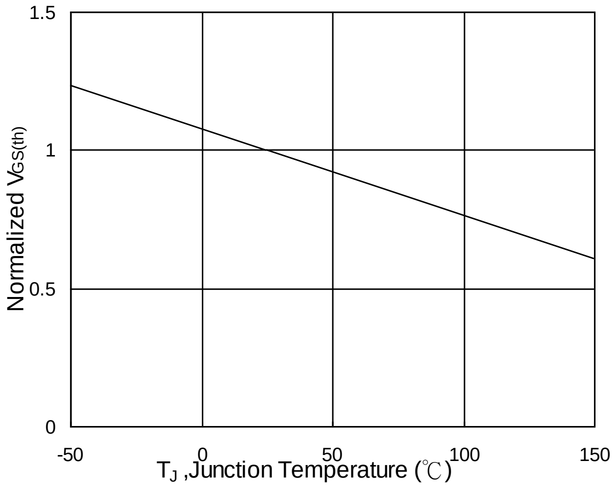


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

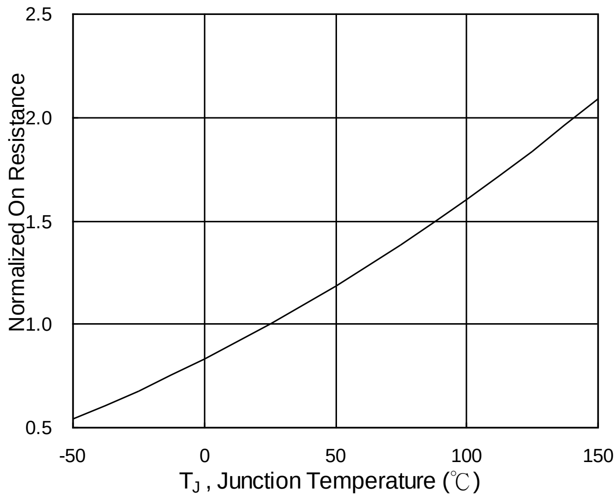


Fig.6 Normalized R_{DSON} v.s T_J

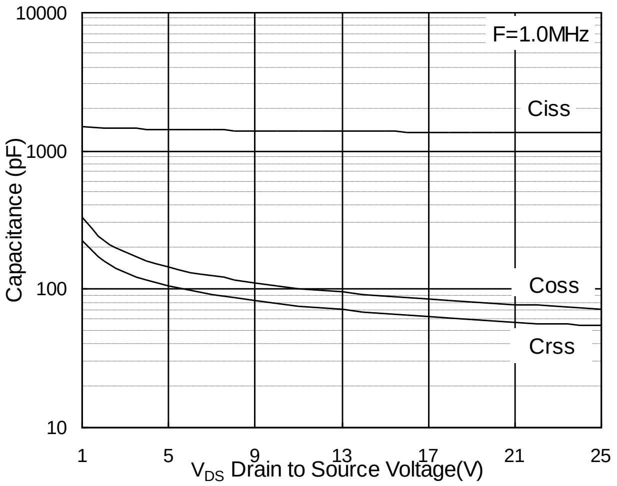


Fig.7 Capacitance

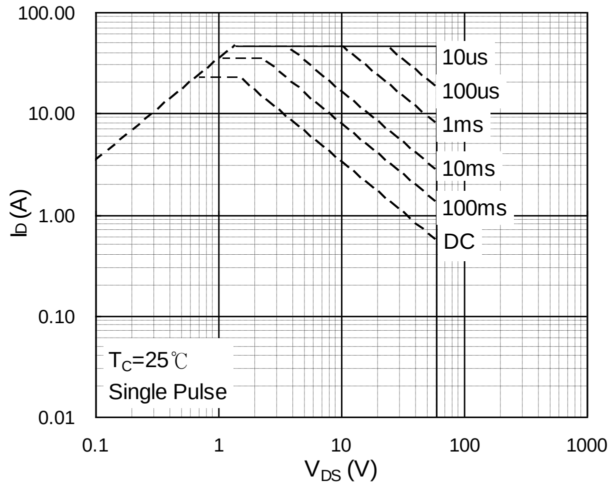


Fig.8 Safe Operating Area

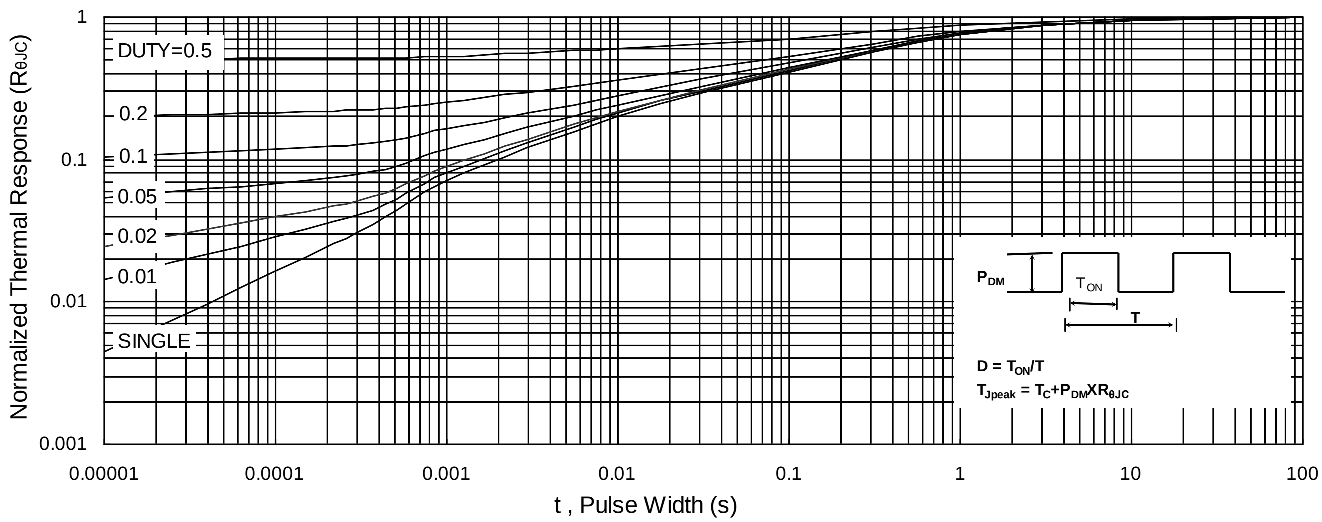


Fig.9 Normalized Maximum Transient Thermal Impedance

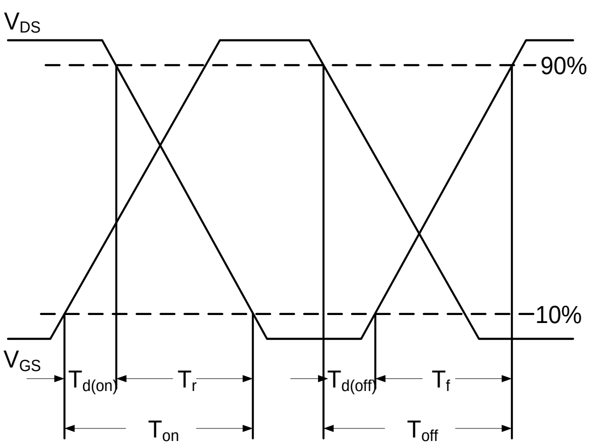


Fig.10 Switching Time Waveform

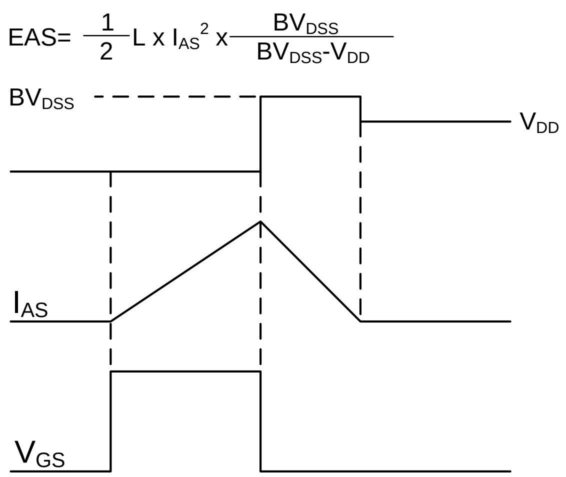


Fig.11 Unclamped Inductive Waveform

P-Channel Typical Characteristics

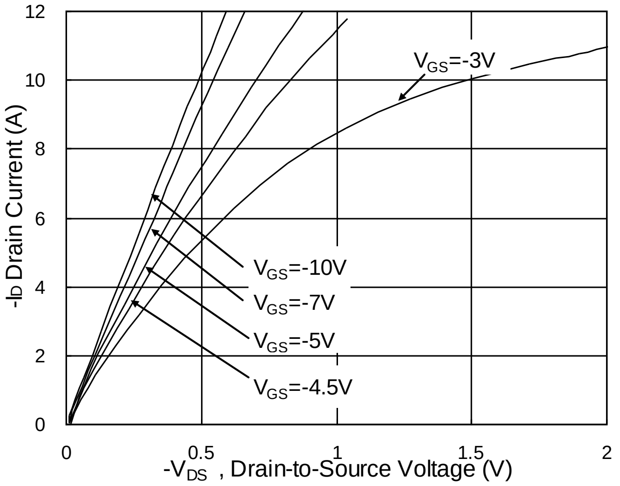


Fig.1 Typical Output Characteristics

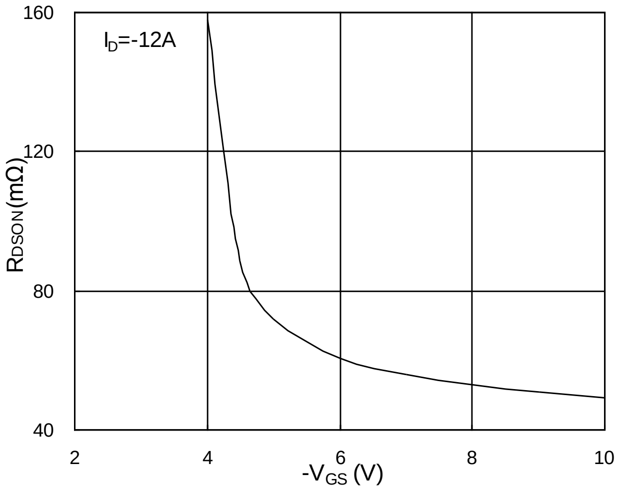


Fig.2 On-Resistance v.s Gate-Source

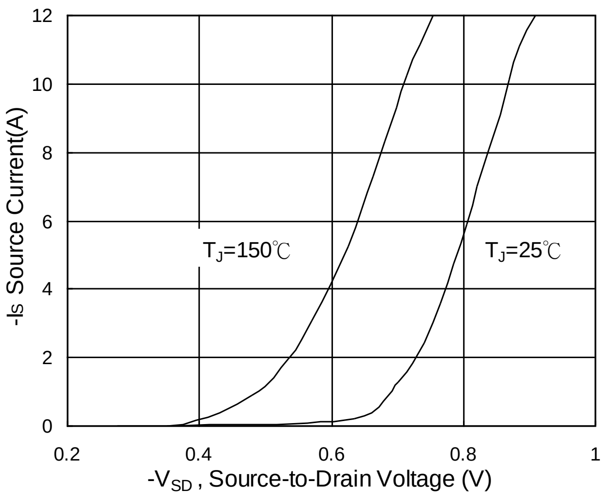


Fig.3 Forward Characteristics of Reverse

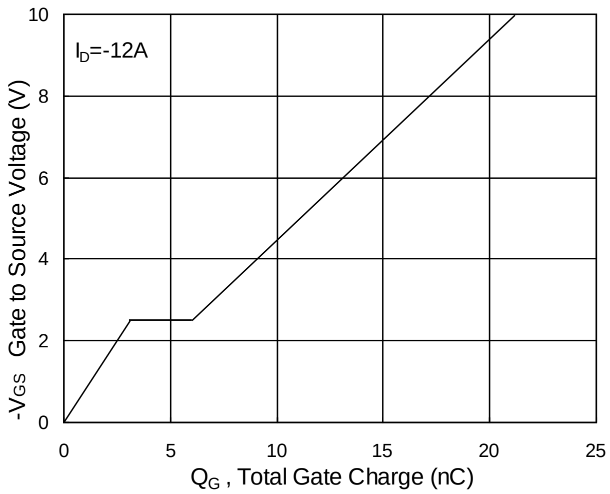


Fig.4 Gate-Charge Characteristics

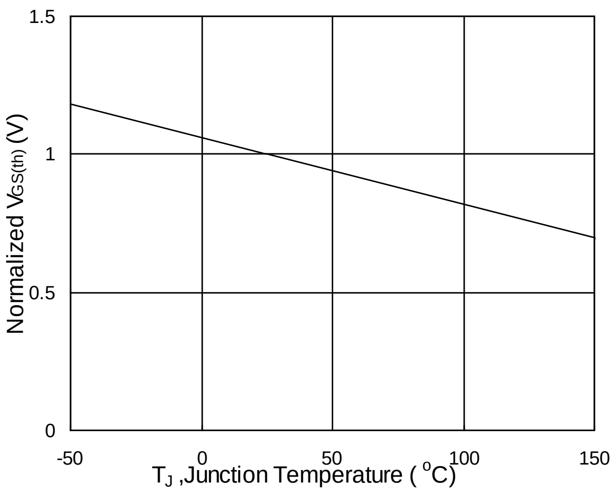


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

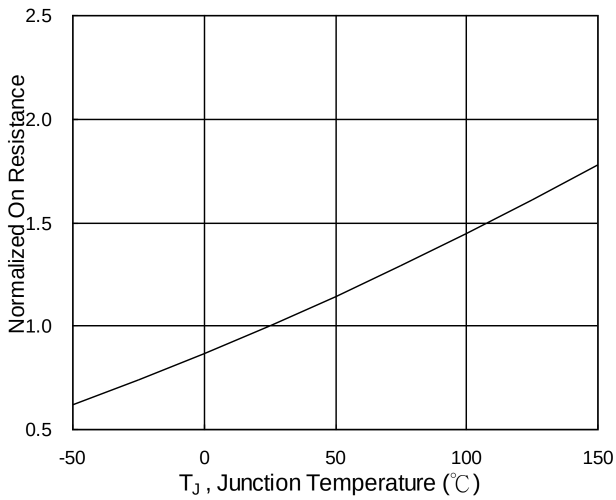


Fig.6 Normalized R_{DSON} v.s T_J

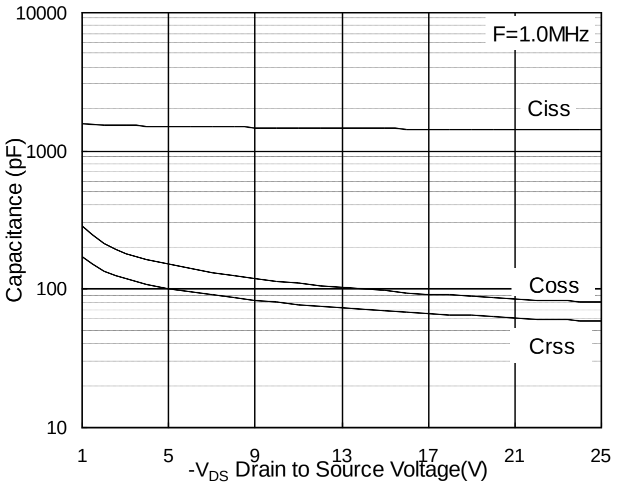


Fig.7 Capacitance

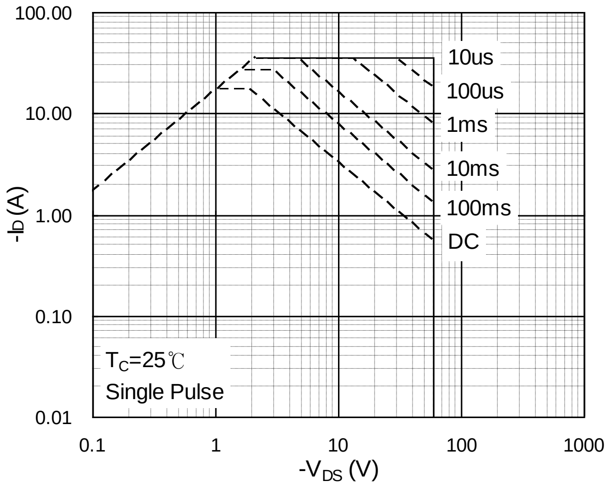


Fig.8 Safe Operating Area

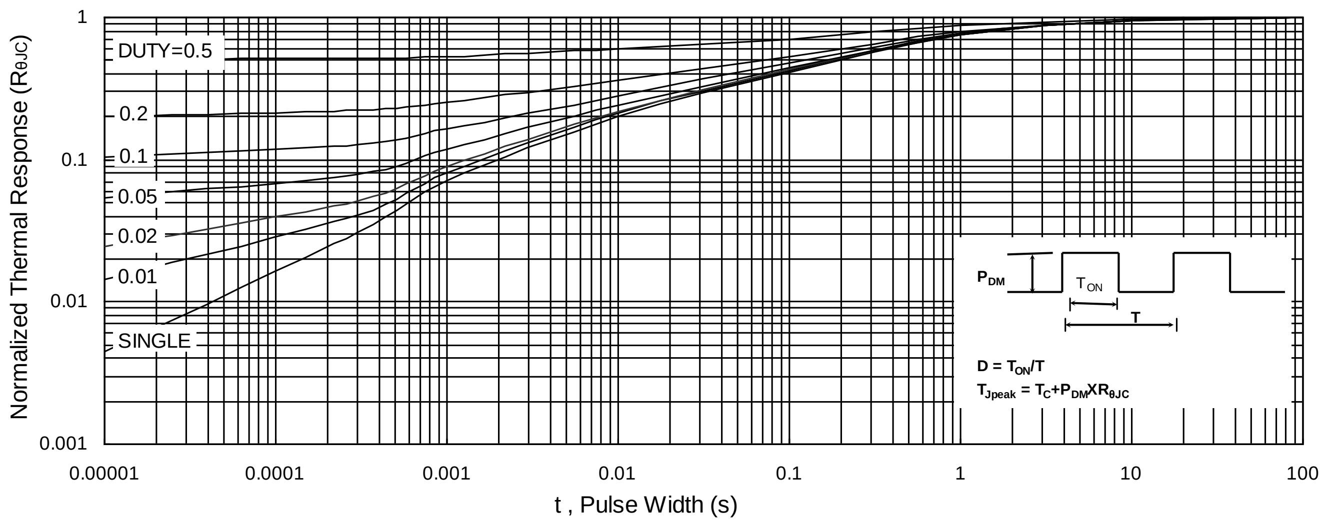


Fig.9 Normalized Maximum Transient Thermal Impedance

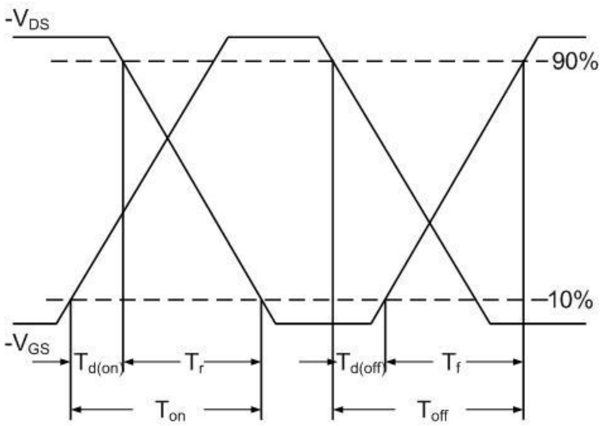


Fig.10 Switching Time Waveform

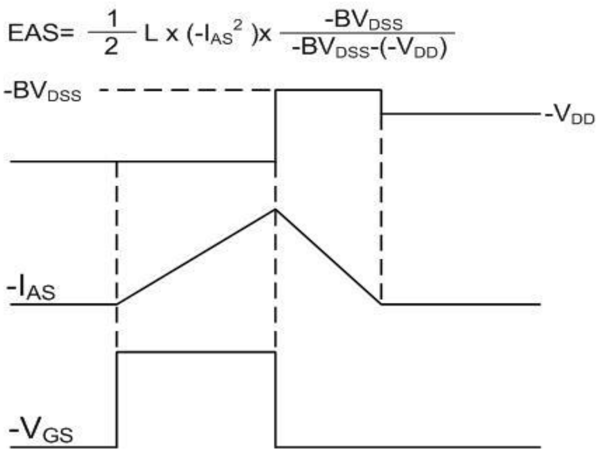
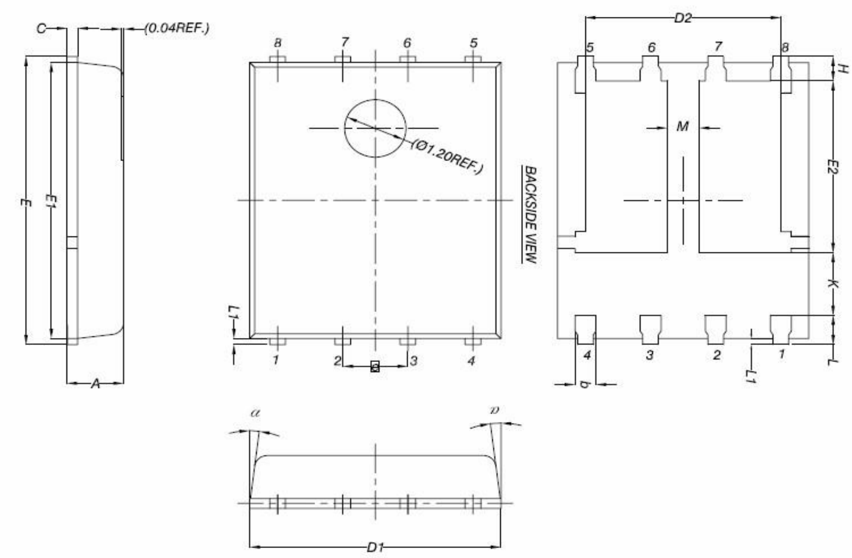


Fig.11 Unclamped Inductive Waveform

Package Mechanical Data-DFN5*6-8L-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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Edition	Date	Change
Rve1.0	2019/5/31	Initial release