

30V N+P-Channel Enhancement Mode MOSFET

Description

The AP15G03NF uses 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

$V_{DS} = 30V$ $I_D = 18A$

$R_{DS(ON)} < 22m\Omega$ @ $V_{GS}=10V$ (Type: 15m Ω)

$V_{DS} = -30V$ $I_D = -15A$

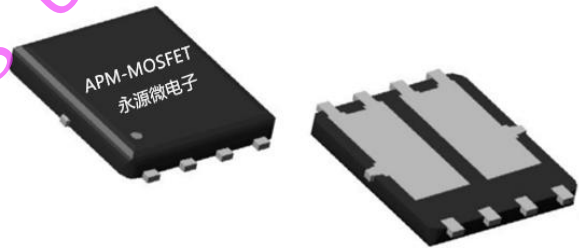
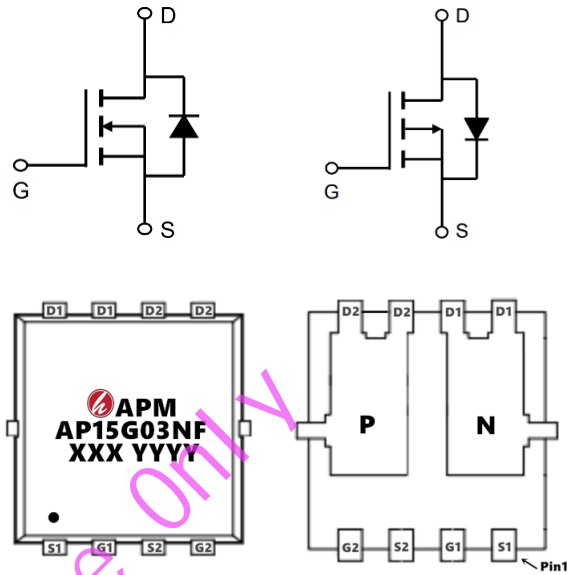
$R_{DS(ON)} < 32m\Omega$ @ $V_{GS}=-10V$ (Type: 25m Ω)

Application

Wireless charging

Boost driver

Brushless motor



Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
AP15G03NF	PDFN5*6-8L	AP15G03NF XXX YYYY	5000

Absolute Maximum Ratings ($T_c=25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
VDS	Drain-Source Voltage	30	-30	V
VGS	Gate-Source Voltage	± 20	± 20	V
$I_D@T_A=25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	18	-15	A
$I_D@T_A=100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	10	-8	A
IDM	Pulsed Drain Current ²	52	-45	A
EAS	Single Pulse Avalanche Energy ³	22	45	mJ
IAS	Avalanche Current	21	-30	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ⁴	18	18	W
TSTG	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	55		$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10sec$)	5		$^\circ C/W$

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Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	30	32.5	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=10V, I_D=10A$	---	15	22	m Ω
		$V_{GS}=4.5V, I_D=5A$	---	20	30	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	1.0	1.6	2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	uA
		$V_{DS}=24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=5V, I_D=10A$	---	16	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	2.5	5	Ω
Q_g	Total Gate Charge (4.5V)	$V_{DS}=20V, V_{GS}=4.5V, I_D=10A$	---	7.2	---	nC
Q_{gs}	Gate-Source Charge		---	1.4	---	
Q_{gd}	Gate-Drain Charge		---	2.2	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=5A$	---	4.1	---	ns
T_r	Rise Time		---	9.8	---	
$T_{d(off)}$	Turn-Off Delay Time		---	15.5	---	
T_f	Fall Time		---	6.0	---	
C_{iss}	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	---	572	---	pF
C_{oss}	Output Capacitance		---	81	---	
C_{rss}	Reverse Transfer Capacitance		---	65	---	
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{Force Current}$	---	---	10	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$	---	---	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 $\cong 300\mu s$, duty cycle $\cong 2\%$
- 3、 The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=10A$
- 4、 The power dissipation is limited by 150 $^\circ\text{C}$ 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.

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Electrical Characteristics ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	-33	---	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-10V, I_D=-7A$	---	25	32	m Ω
		$V_{GS}=-4.5V, I_D=-5A$	---	37	54	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.0	---	-2.5	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	5	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-7A$	---	15	---	S
R_g	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	15	30	
Q_g	Total Gate Charge (-4.5V)		---	9.8	---	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-20V, V_{GS}=-4.5V, I_D=-7A$	---	2.2	---	
Q_{gd}	Gate-Drain Charge		---	3.4	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-5A$	---	16.4	---	ns
T_r	Rise Time		---	20.2	---	
$T_{d(off)}$	Turn-Off Delay Time		---	55	---	
T_f	Fall Time		---	10	---	
C_{iss}	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	930	---	pF
C_{oss}	Output Capacitance		---	148	---	
C_{rss}	Reverse Transfer Capacitance		---	115	---	
I_S	Continuous Source Current ^{1,5}	$V_G=V_D=0V, \text{Force Current}$	---	---	-8	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-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 $\cong 300\mu s$, duty cycle $\cong 2\%$
- 3、The EAS data shows Max. rating. The test condition is $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}, I_{AS}=-10A$
- 4、The power dissipation is limited by 150 $^\circ\text{C}$ 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

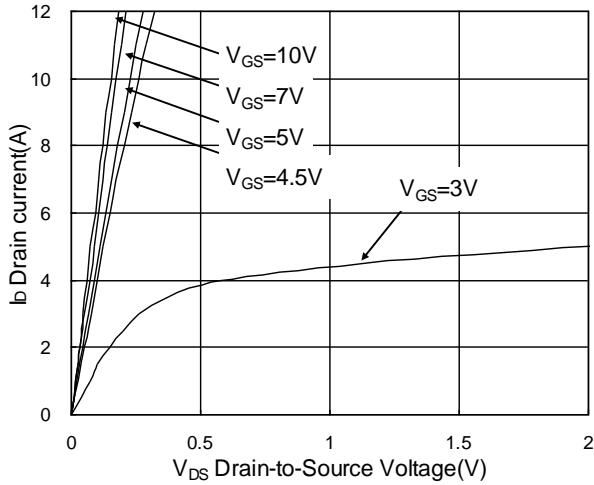


Fig.1 Typical Output Characteristics

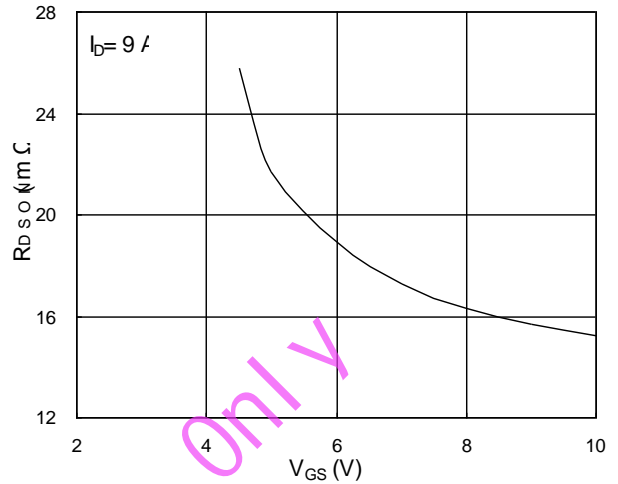


Fig.2 On-Resistance v.s Gate-Source

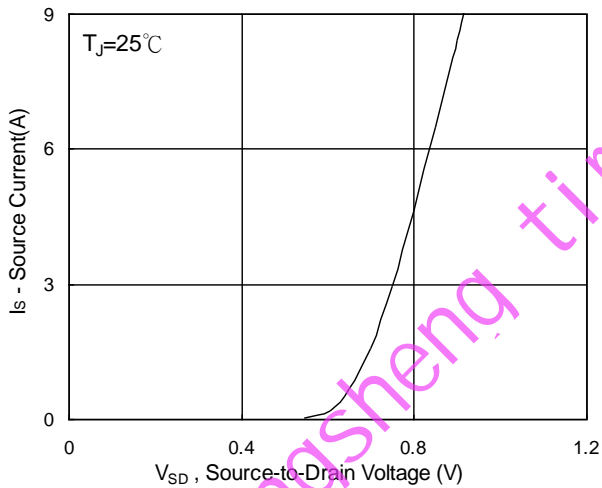


Fig.3 Forward Characteristics Of Reverse

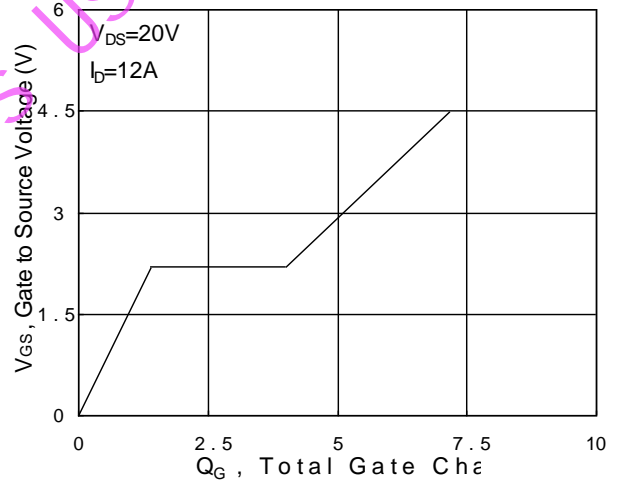


Fig.4 Gate-Charge characteristics

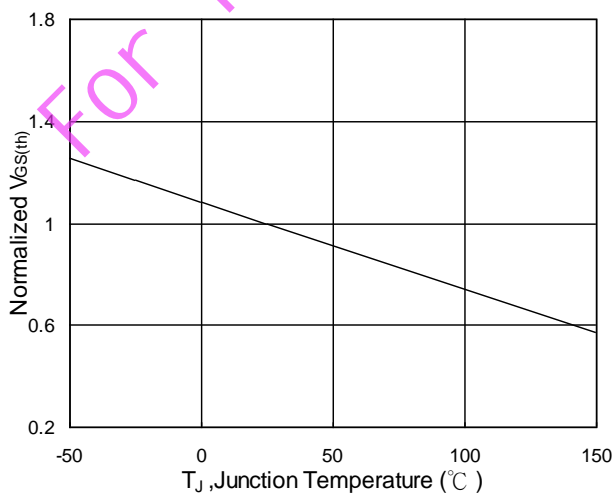


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

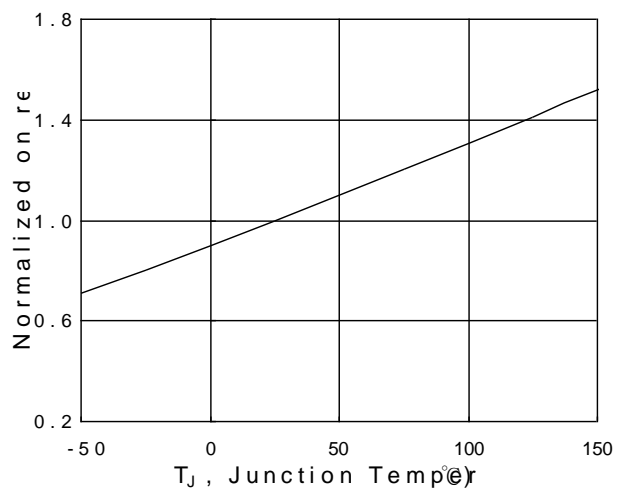


Fig.6 Normalized $R_{DS(on)}$ v.s T_J

30V N+P-Channel Enhancement Mode MOSFET

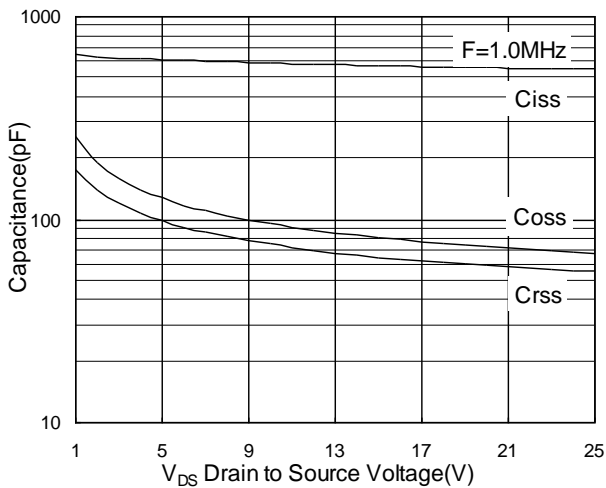


Fig.7 Capacitance

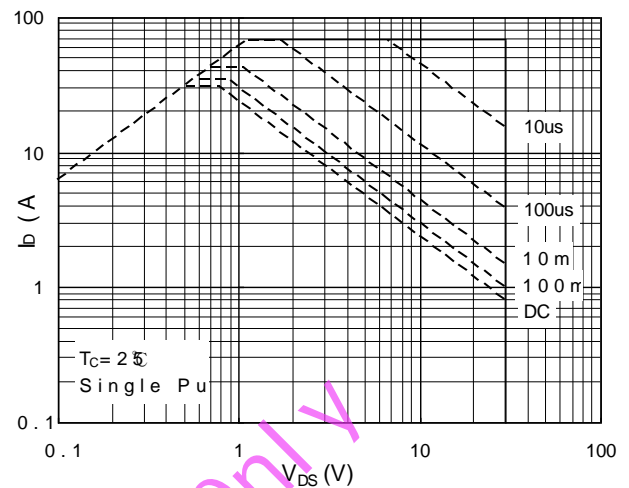


Fig.8 Safe Operating Area

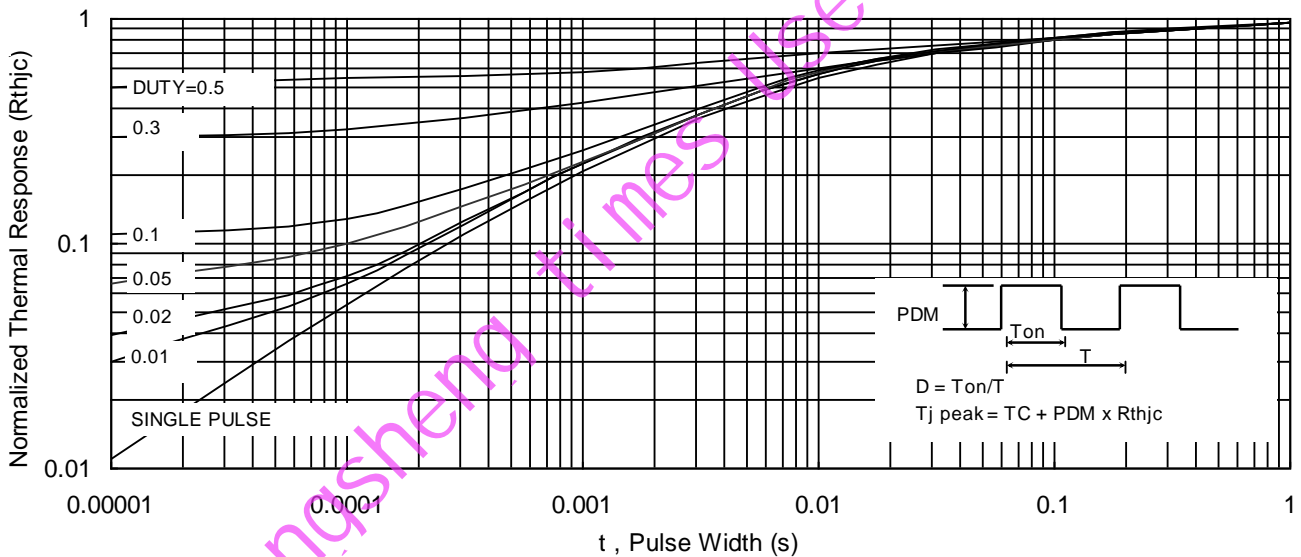


Fig.9 Normalized Maximum Transient Thermal Impedance

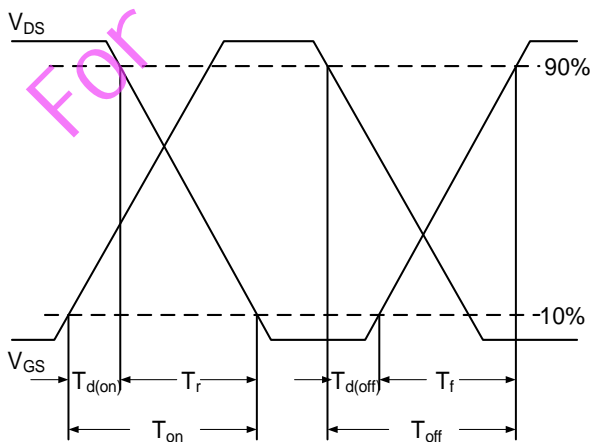


Fig.10 Switching Time Waveform

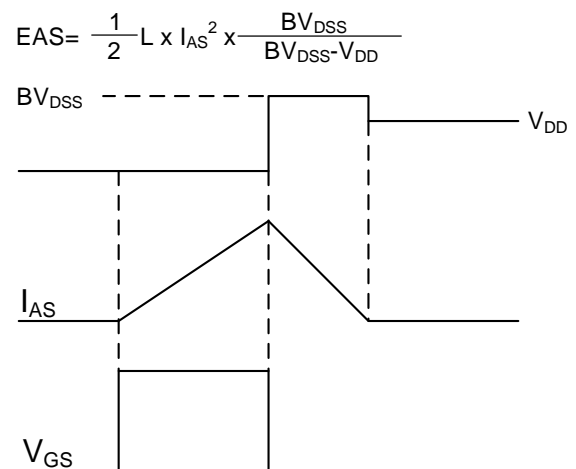


Fig.11 Unclamped Inductive Waveform

P-Typical Characteristics

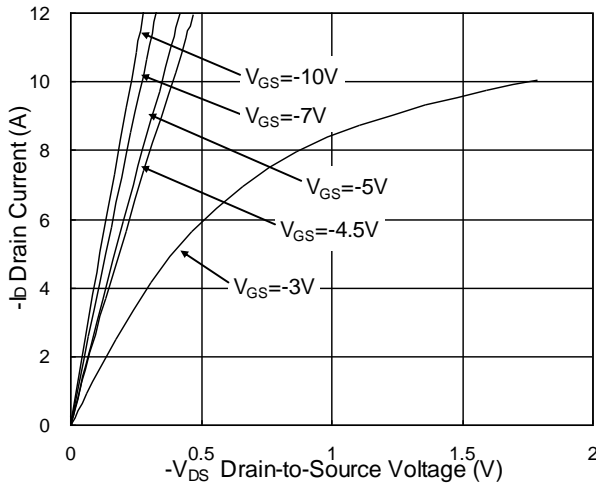


Fig.1 Typical Output Characteristics

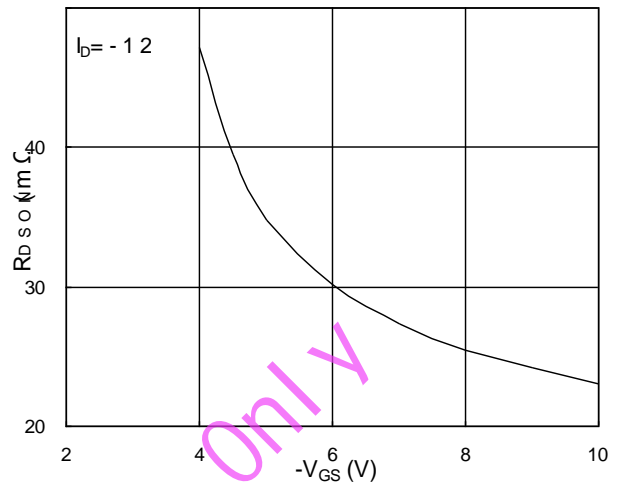


Fig.2 On-Resistance v.s Gate-Source

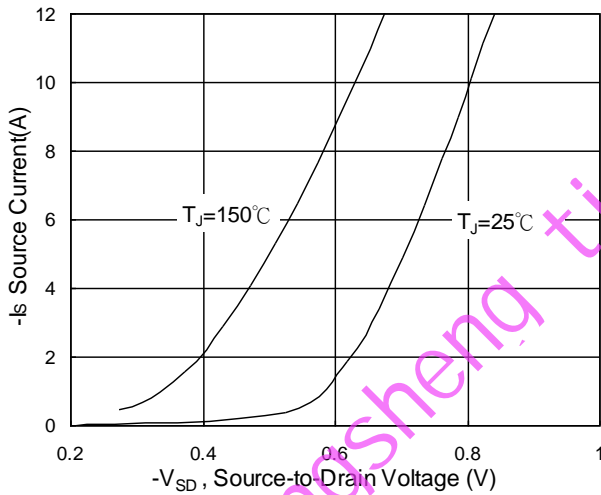


Fig.3 Forward Characteristics Of Reverse

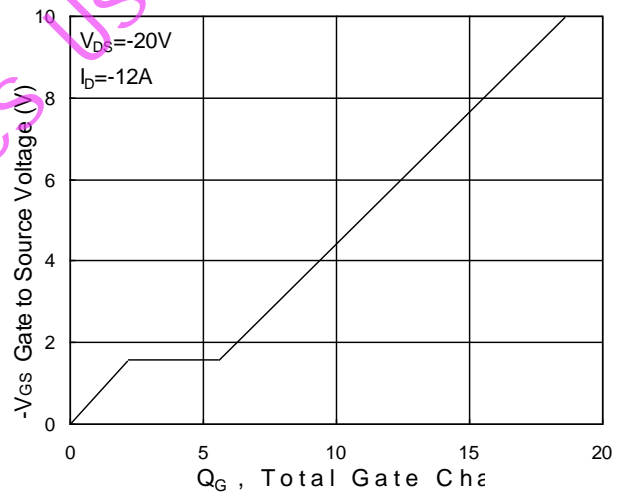


Fig.4 Gate-Charge Characteristics

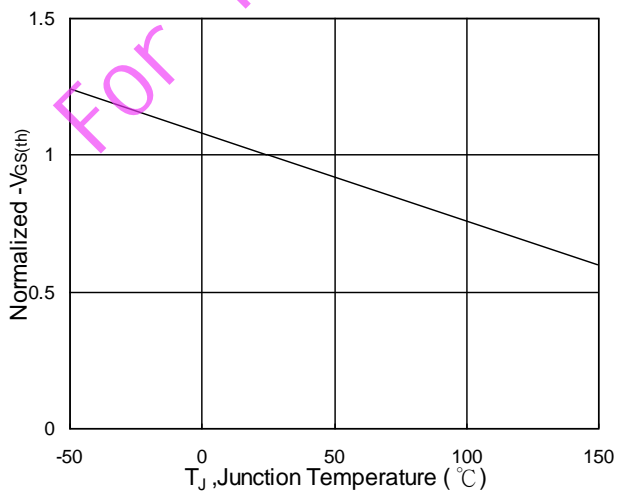


Fig.5 Normalized V_{GS(th)} v.s T_J

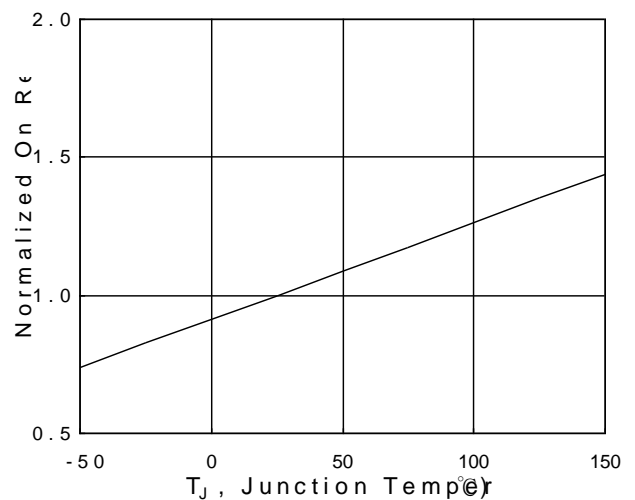


Fig.6 Normalized R_{DS(on)} v.s T_J

30V N+P-Channel Enhancement Mode MOSFET

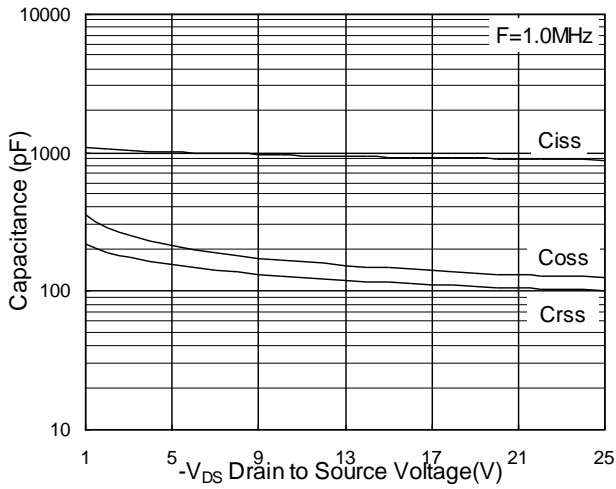


Fig.7 Capacitance

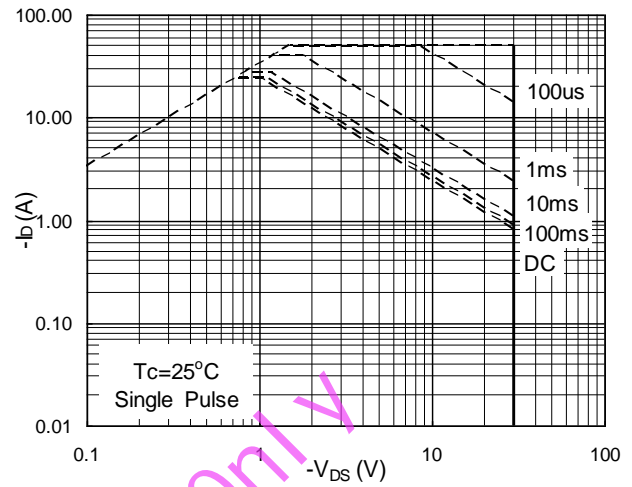


Fig.8 Safe Operating Area

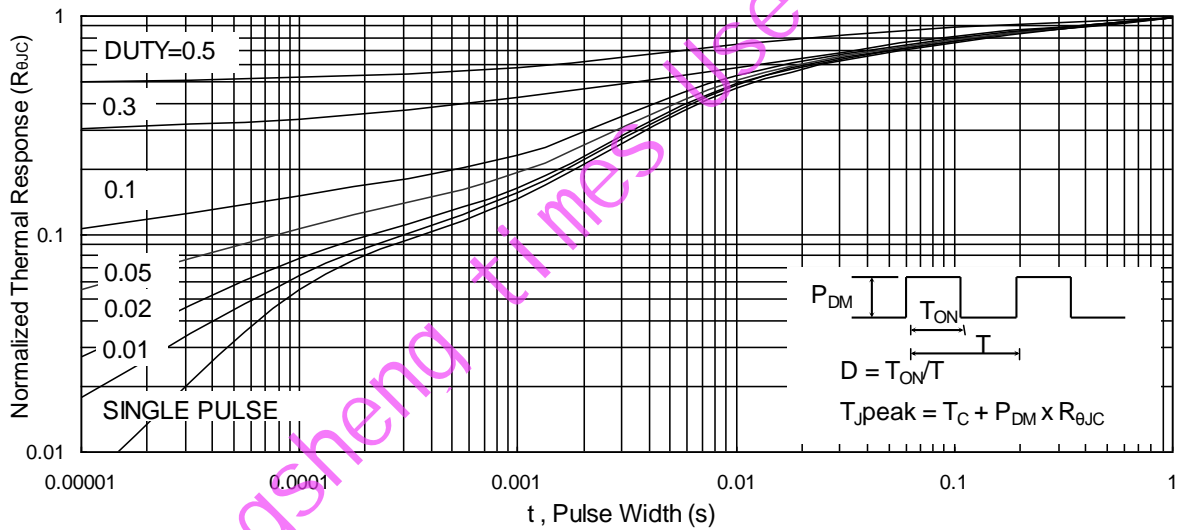


Fig.9 Normalized Maximum Transient Thermal Impedance

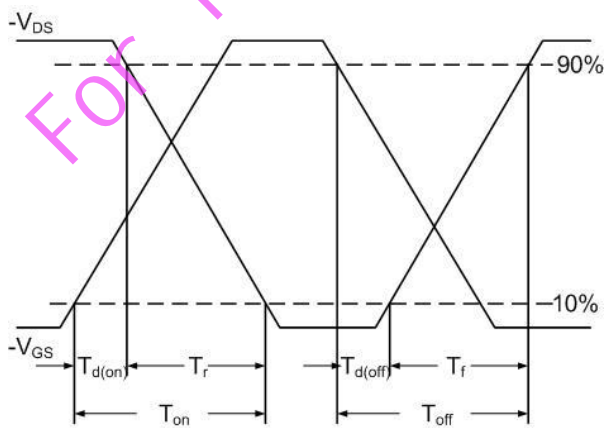


Fig.10 Switching Time Waveform

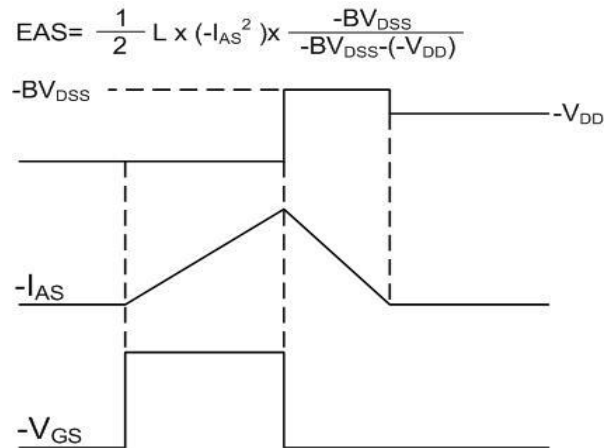
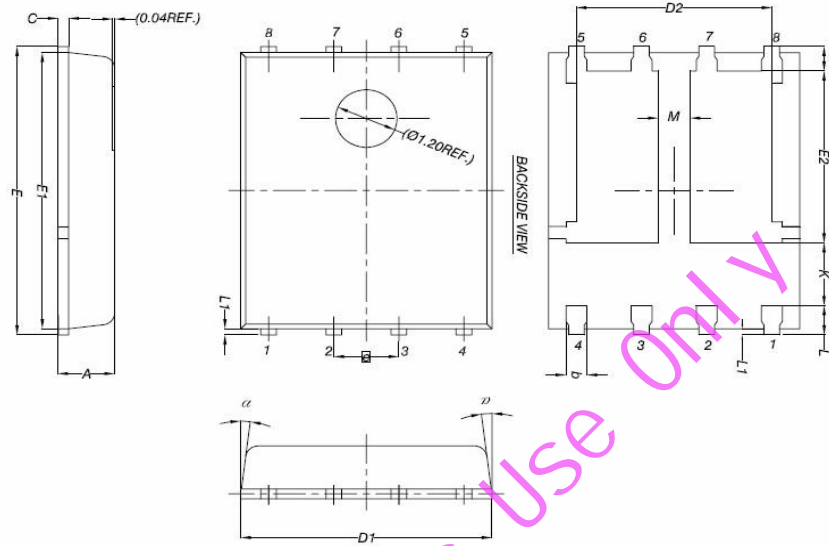


Fig.11 Unclamped Inductive Waveform

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	2020/12/30	Initial release

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