

• General Description

The AGM420MC combines advanced trench MOSFET technology with a low resistance package to provide extremely low $R_{DS(ON)}$.

This device is ideal for load switch and battery protection applications.

• Features

- Advance high cell density Trench technology
- Low $R_{DS(ON)}$ to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance
- 100% Avalanche tested
- 100% DVDS tested

• Application

- MB/VGA Vcore
- SMPS 2nd Synchronous Rectifier
- POL application
- BLDC Motor driver

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM420MC	AGM420MC	SOP8	330mm	12mm	3000

Table 1. Absolute Maximum Ratings ($T_A=25^\circ\text{C}$)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	40	-40	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	± 20	V
I_D	Drain Current-Continuous($T_A=25^\circ\text{C}$) (Note 1)	7.6	-7.5	A
	Drain Current-Continuous($T_A=100^\circ\text{C}$)	5.5	-5.3	A
IDM (pluse)	Drain Current-Pulsed (Note 2)	30.4	-30	A
P_D	Total Power Dissipation($T_A=25^\circ\text{C}$)	2.5	2.5	W
	Total Power Dissipation($T_A=100^\circ\text{C}$)	1.0	1.0	W
EAS	Avalanche energy (Note 3)	64	81	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	$^\circ\text{C}$

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) ¹	---	50	$^\circ\text{C/W}$

Product Summary

BVDSS	$R_{DS(ON)}$	I_D
40V	18m Ω	7.6A
-40V	26m Ω	-7.5A

SOP8 Pin Configuration

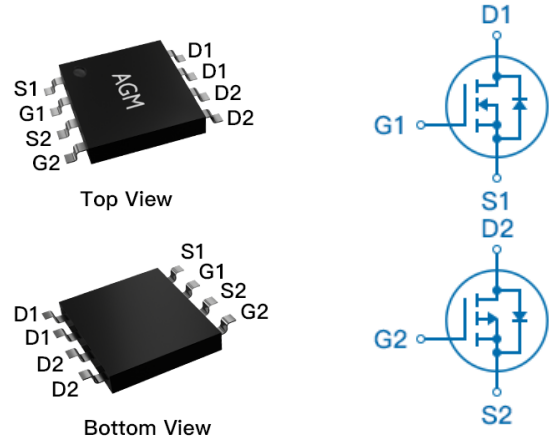


Table 3. N- Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	40	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=40V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±20V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.2	1.6	2.2	V
gFS	Forward Transconductance	VDS=5V,ID=5A	--	8	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=6A	--	18	24	mΩ
		VGS=4.5V, ID=5A	--	24	38	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=20V,VGS=0V, F=1MHZ	--	516	--	pF
Coss	Output Capacitance		--	82	--	pF
Crss	Reverse Transfer Capacitance		--	43	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=10V,VDS=15V, RL=2.5Ω,RGEN=3Ω	--	4.5	--	nS
tr	Turn-on Rise Time		--	2.5	--	nS
td(off)	Turn-Off Delay Time		--	14.5	--	nS
tf	Turn-Off Fall Time		--	3.5	--	nS
Qg	Total Gate Charge	VGS=10V, VDS=20V, ID=6A	--	8.9	--	nC
Qgs	Gate-Source Charge		--	2.4	--	nC
Qgd	Gate-Drain Charge		--	1.4	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	7.6	A
VSD	Forward on Voltage	VGS=0V,IS=6A	--	0.8	1.2	V
trr	Reverse Recovery Time	IF=6A , dI/dt=100A/μs , TJ=25°C	--	--	--	ns
Qrr	Reverse Recovery Charge		--	--	--	nc

Notes 1.The maximum current rating is package limited.

Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: T_J=25°C,VDD=25V,Vgs=10V,ID=16A,L=0.5mH,RG=25ohm

Table 3. P-Channel Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	V _{GS} =0V ID=-250μA	-40	--	--	V
IDSS	Zero Gate Voltage Drain Current	V _{DS} =-40V, V _{GS} =0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V	--	--	±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , ID=-250μA	-1.2	-1.5	-2.2	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, ID=-3A	--	10	--	S
R _{DS(on)}	Drain-Source On-State Resistance	V _{GS} =-10V, ID=-6A	--	26	34	mΩ
		V _{GS} =-4.5V, ID=-5A	--	38	49	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-20V V _{GS} =0V, F=1MHZ	--	931	--	pF
C _{oss}	Output Capacitance		--	96	--	pF
C _{rss}	Reverse Transfer Capacitance		--	72	--	pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz	--	--	--	Ω
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-20V, ID=-5A, R _{GEN} =2.5Ω	--	7.2	--	nS
t _r	Turn-on Rise Time		--	14	--	nS
t _{d(off)}	Turn-Off Delay Time		--	21	--	nS
t _f	Turn-Off Fall Time		--	8.1	--	nS
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-20V, ID=-5A	--	18	--	nC
Q _{gs}	Gate-Source Charge		--	3.2	--	nC
Q _{gd}	Gate-Drain Charge		--	3.8	--	nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current(Body Diode)		--	--	-7.5	A
V _{SD}	Forward on Voltage	V _{GS} =0V, I _S =-6A	--	--	-1.2	V
t _{rr}	Reverse Recovery Time	I _F =-6A , dI/dt=100A/μs , T _J =25°C	--	26	--	ns
Q _{rr}	Reverse Recovery Charge		--	18	--	nc

Notes 1. The maximum current rating is package limited.

Notes 2. Repetitive Rating: Pulse width limited by maximum junction temperature Notes

3. EAS condition: T_J=25°C , V_{DD}=-25V, V_{gs}=-10V, I_D=-18A, L=0.5mH, R_G=25ohm

N- Channel Typical Electrical and Thermal Characteristics (Curves)

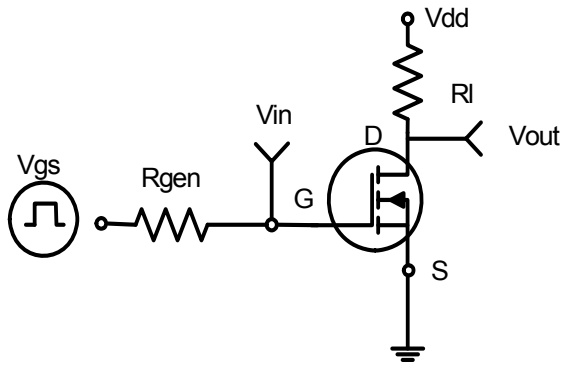


Figure 1: Switching Test Circuit

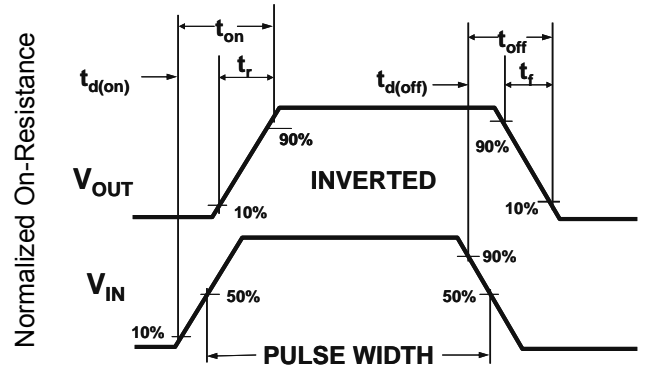


Figure 2: Switching Waveforms

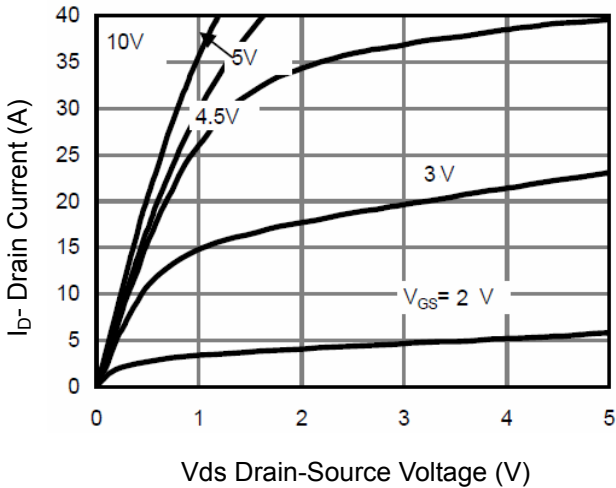


Figure 3 Output Characteristics

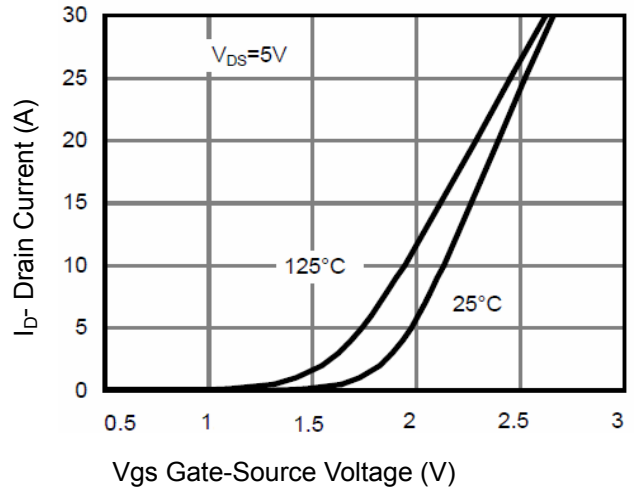


Figure 4 Transfer Characteristics

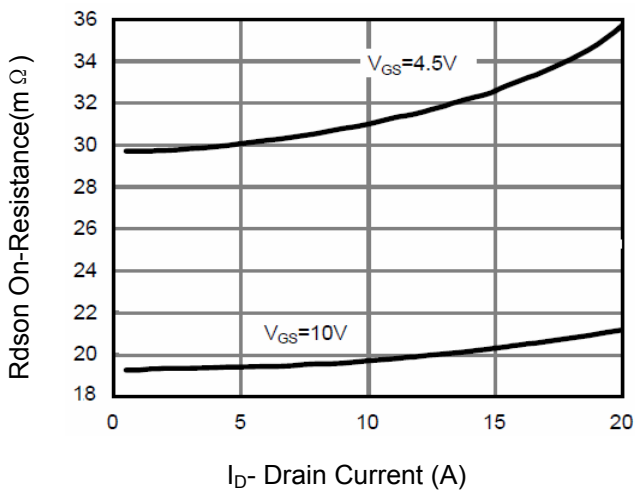


Figure 5 Drain-Source On-Resistance

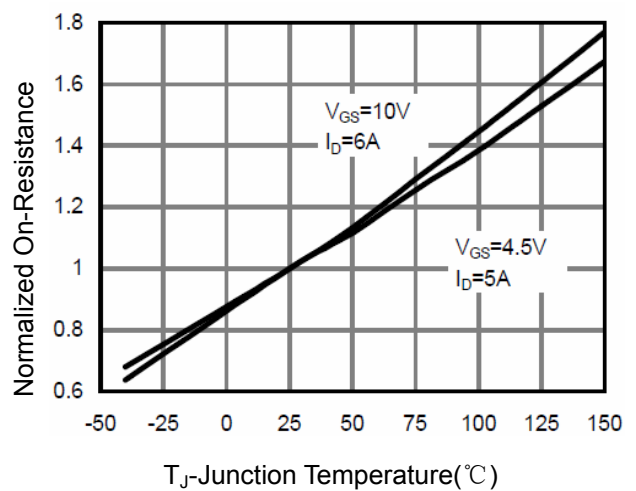


Figure 6 Drain-Source On-Resistance

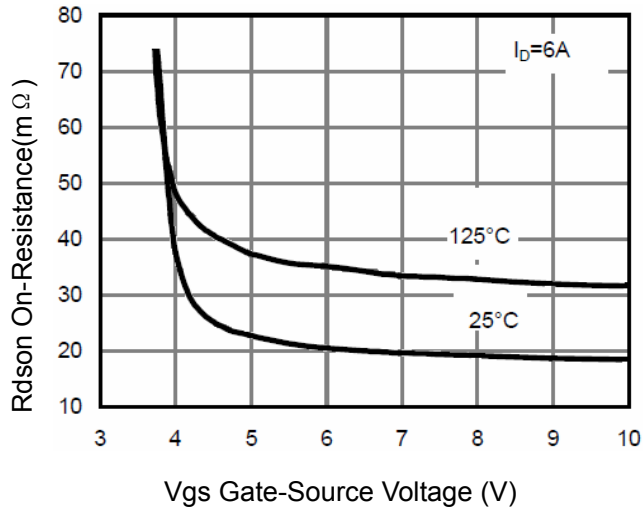


Figure 7 Rdson vs Vgs

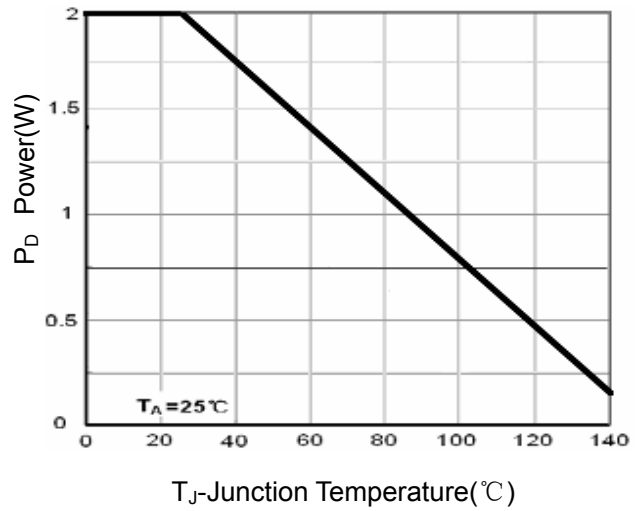


Figure 8 Power Dissipation

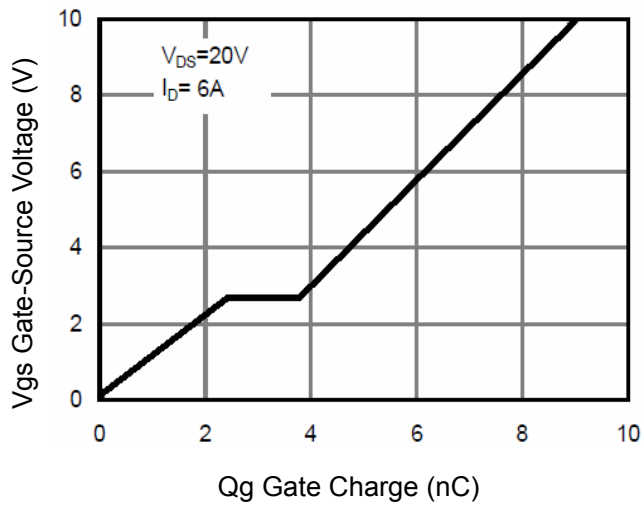


Figure 9 Gate Charge

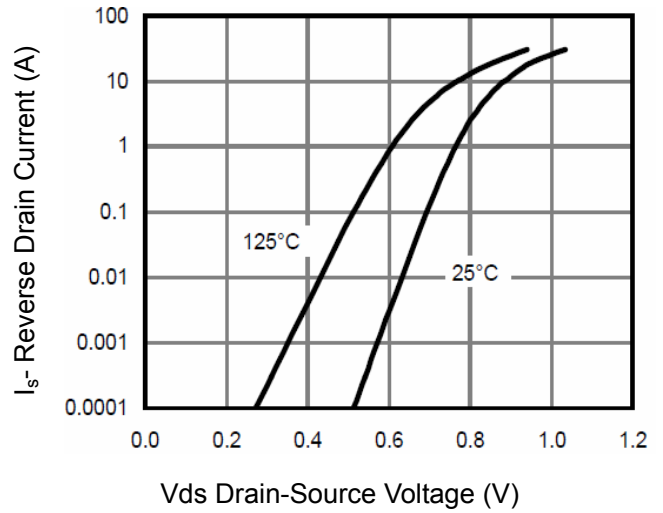


Figure 10 Source- Drain Diode Forward

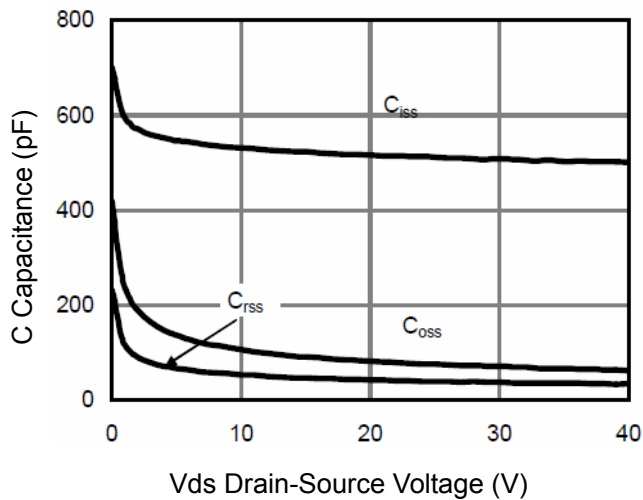


Figure 11 Capacitance vs Vds

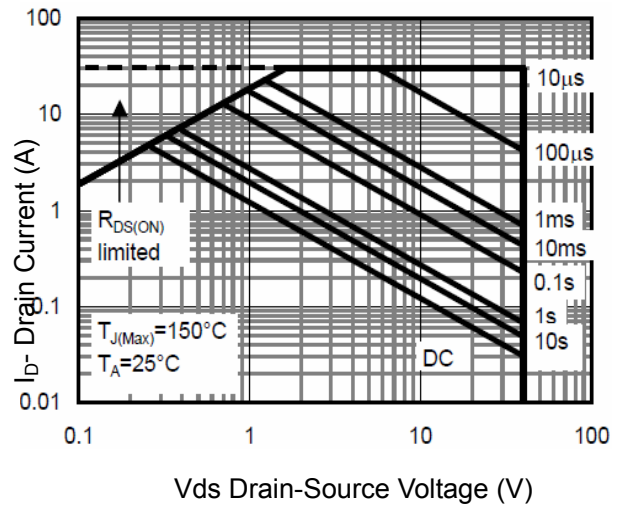


Figure 12 Safe Operation Area

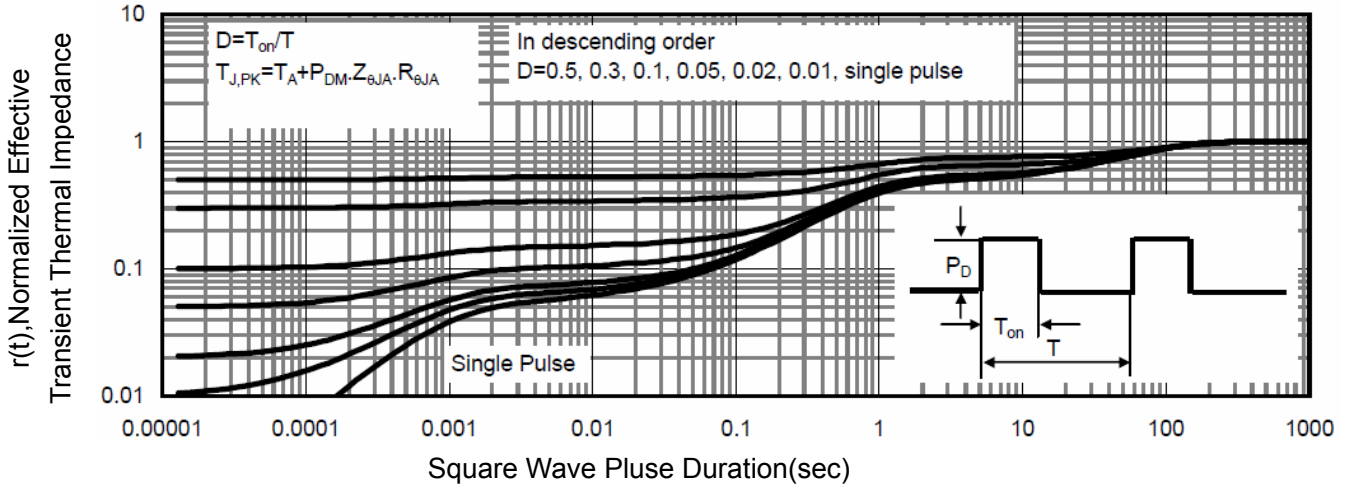
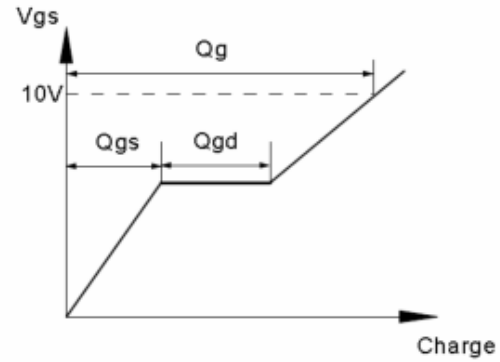
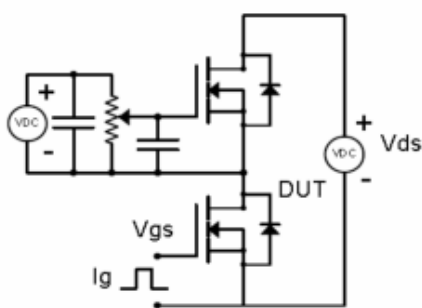


Figure 13 Normalized Maximum Transient Thermal Impedance

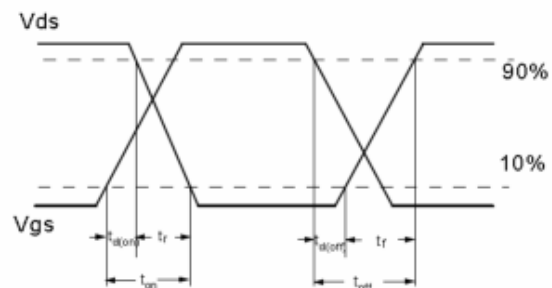
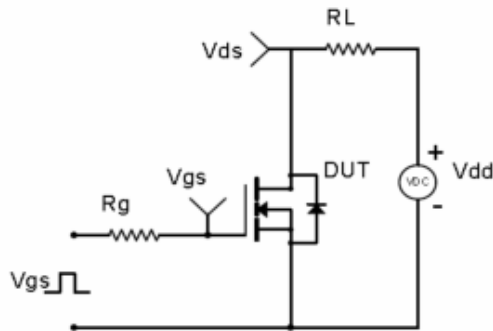
P- Channel Typical Electrical and Thermal Characteristics (Curves)

Test Circuit & Waveform

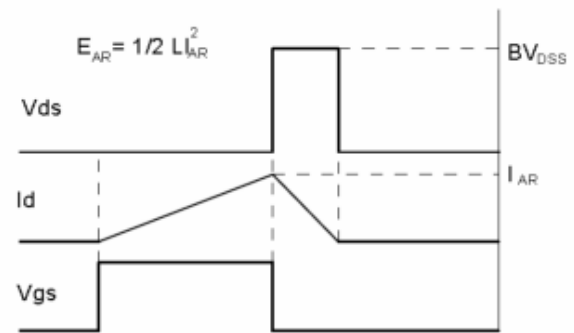
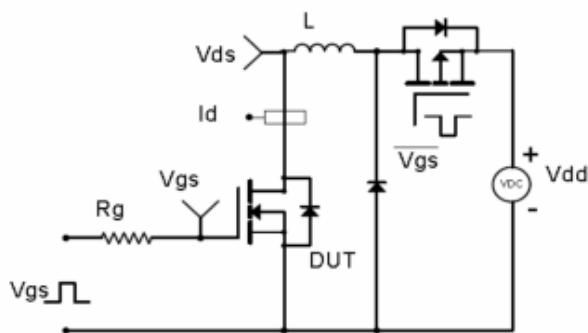
Gate Charge Test Circuit & Waveform



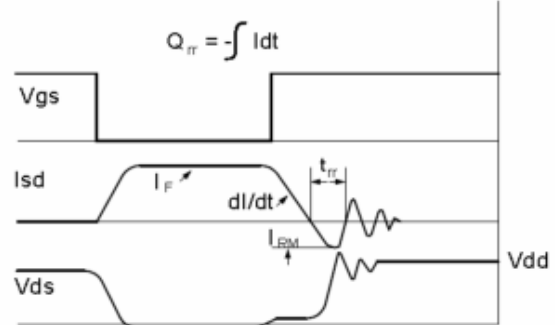
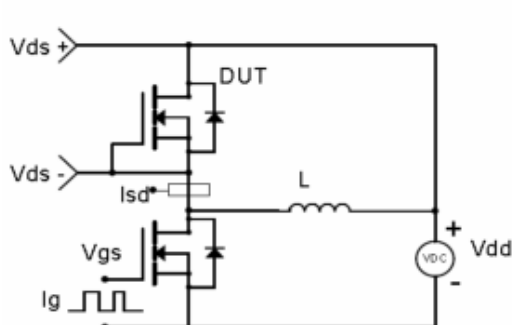
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Typical Performance Characteristics

Fig.1 Output Characteristics

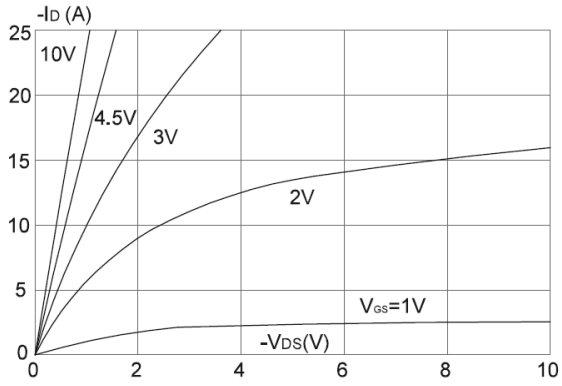


Fig.2 Typical Transfer Characteristics

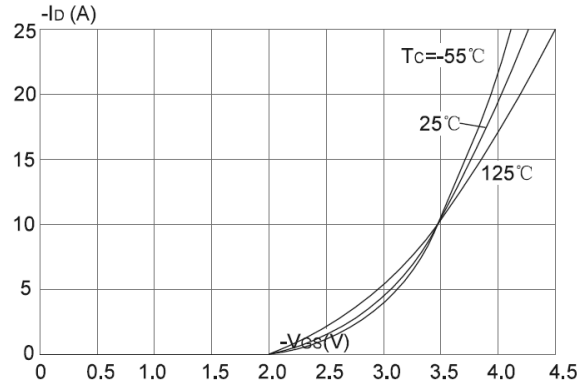


Fig.3 On-resistance vs. Drain Current

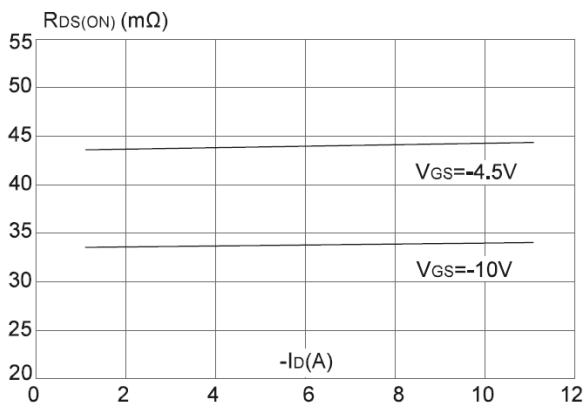


Fig. 4 Body Diode Characteristics

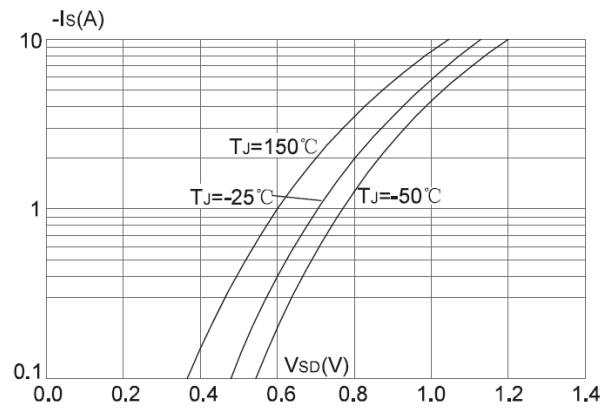


Fig.5 Gate Charge Characteristics

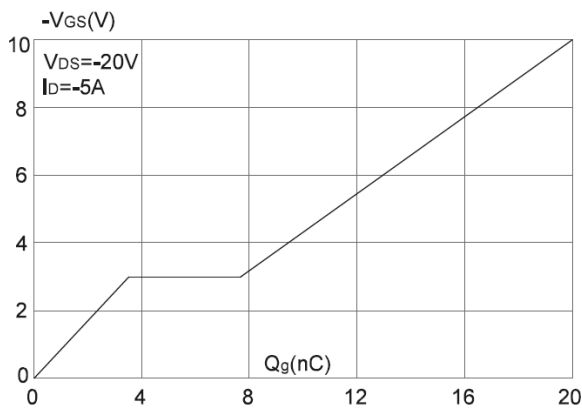


Fig. 6 Capacitance Characteristics

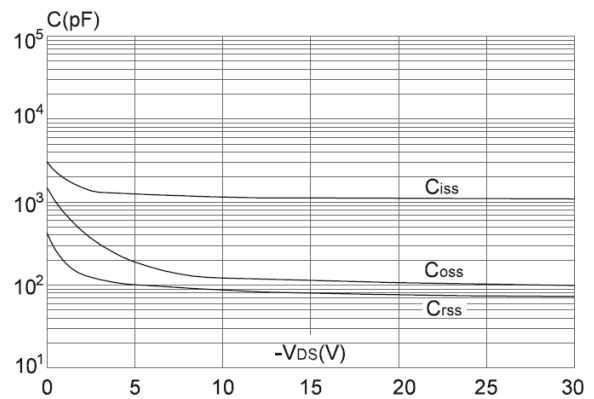


Fig.7 Normalized Breakdown Voltage vs. Junction Temperature

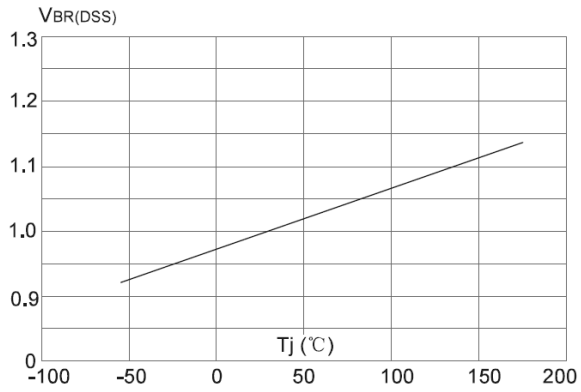


Fig. 8 Normalized on Resistance vs. Junction Temperature

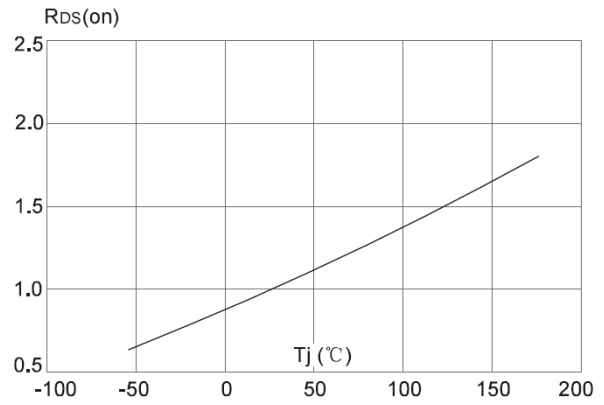


Fig.9 Maximum Continuous Drain Current vs. Case Temperature

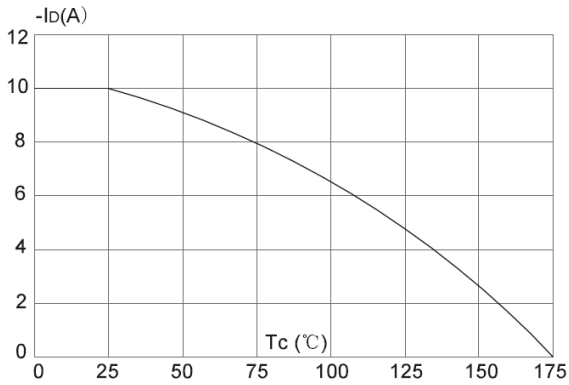


Fig.10 Safe Operating Area

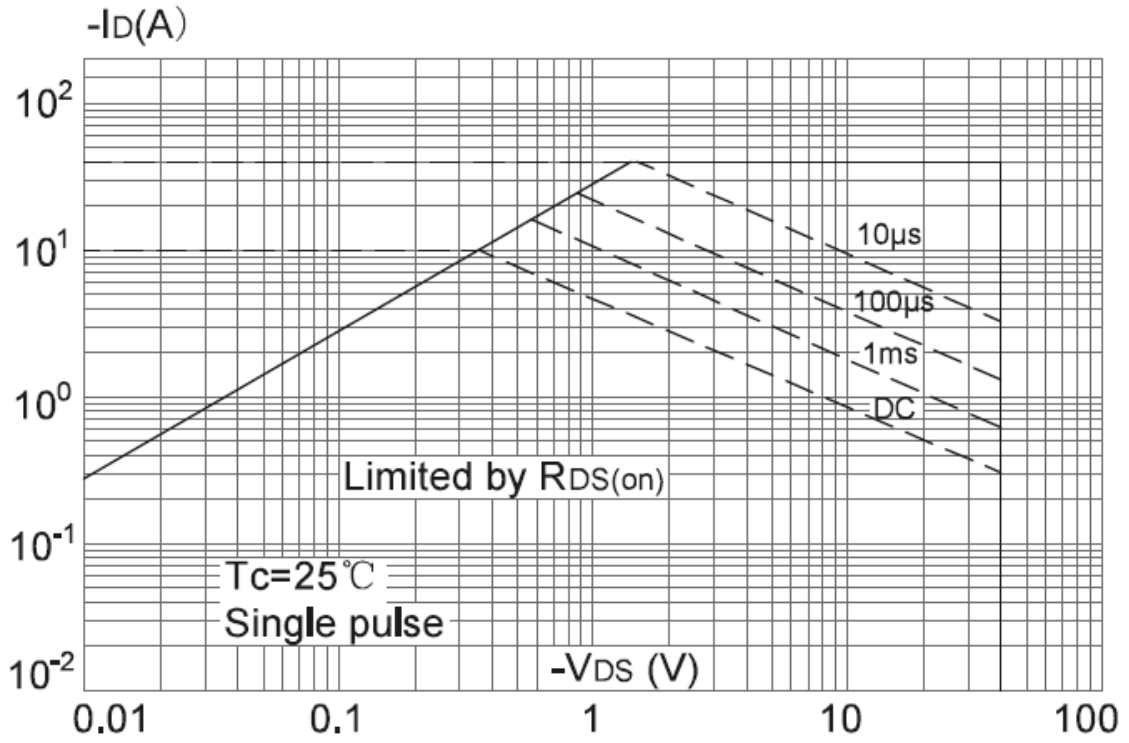
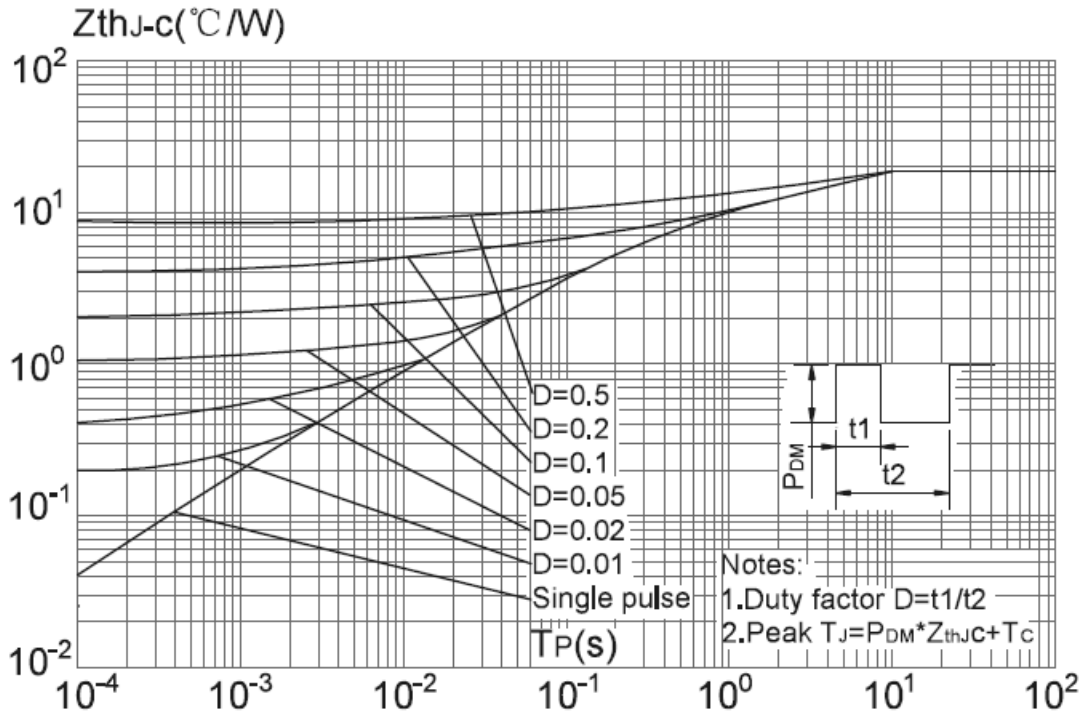
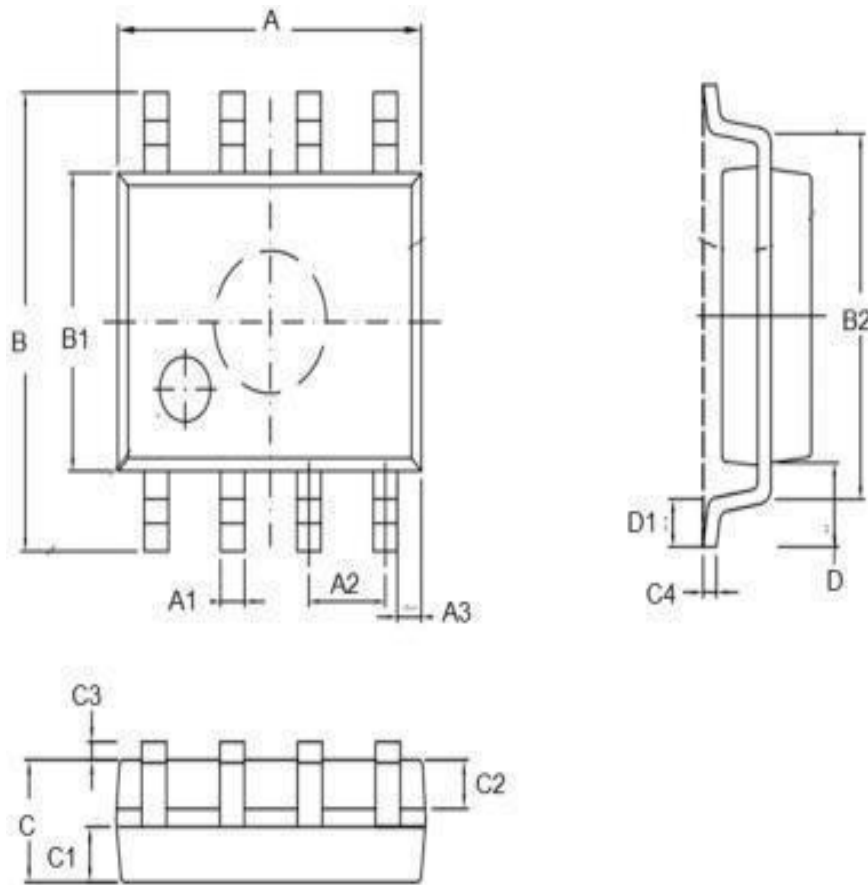


Fig. 11 Transient Thermal Response Curve



•Dimensions(SOP8)

SYMBOL	min	TYP	max	SYMBOL	min		max
A	4.80		5.00	C	1.30		1.50
A1	0.37		0.47	C1	0.55		0.75
A2		1.27		C2	0.55		0.65
A3		0.41		C3	0.05		0.20
B	5.80		6.20	C4	0.19	0.20	0.23
B1	3.80		4.00	D		1.05	
B2		5.00		D1	0.40		0.62




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