General Description

The AGM216ME 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

Product Summary

BVDSS	RDSON	ID
20V	21mΩ	3.3A
-20V	27.5mΩ	-5.6A

SOT23-6L Pin Configuration

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM216ME	AGM216ME	SOT23-6L	178mm	8mm	3000

Table 1. Absolute Maximum Ratings (T_A=25°C)

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	20	-20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±12	±10	V
I_D	Drain Current-Continuous(T_A=25℃) (Note 1)	3.3	-5.6	A
	Drain Current-Continuous(TA=100℃)	2.1	-3.7	A
IDM (pluse)	Drain Current-Pulsed (Note 2)	13.2	-22.4	A
P_D	Total Power Dissipation(T_A=25℃)	1.25	1.25	W
EAS	Avalanche energy (Note 3)	25	16	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	℃

Table 2. Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta Ja}$	Thermal Resistance Junction-ambient (Steady State)[1]	---	100	℃/W

Table 3. N- Channel Electrical Characteristics (TJ=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	20	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=19.5V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±12V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	0.5	0.7	0.9	V
gFS	Forward Transconductance	VDS=5V,ID=4A	--	3	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=4.5V, ID=5A	--	21	24	mΩ
		VGS=2.5V, ID=4A	--	26	30	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=10V,VGS=0V, F=1MHZ	--	355	--	pF
Coss	Output Capacitance		--	68	--	pF
Crss	Reverse Transfer Capacitance		--	59	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=4.5V,VDS=10V ID=4A,RGEN=3Ω	--	15	--	nS
tr	Turn-on Rise Time		--	49	--	nS
td(off)	Turn-Off Delay Time		--	19	--	nS
tf	Turn-Off Fall Time		--	16	--	nS
Qg	Total Gate Charge	VGS=4.5V, VDS=10V, ID=2A	--	5.5	--	nC
Qgs	Gate-Source Charge		--	0.6	--	nC
Qgd	Gate-Drain Charge		--	0.9	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	3.3	A
VSD	Forward on Voltage	VGS=0V,IS=5A	--	--	1.2	V
trr	Reverse Recovery Time	IF=5A , dI/dt=100A/μs , TJ=25℃	--	--	--	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: TJ=25℃,VDD=15V,Vgs=10V,ID=10A, L=0.5mH,RG=25ohm

Table 3. P-Channel Electrical Characteristics (TJ=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250μA	-20	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-20V,VGS=0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	VGS=±10V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=-250μA	-0.4	-0.6	-1.0	V
gFS	Forward Transconductance	VDS=-5V,ID=-3A	--	3	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-4.5V, ID=-4A	--	27.5	32	mΩ
		VGS=-2.5V, ID=-3A	--	37	45	mΩ
Dynamic Characteristics						
Ciss	Input Capacitance	VDS=-10V,VGS=0V, F=1MHZ	--	671	--	pF
Coss	Output Capacitance		--	115	--	pF
Crss	Reverse Transfer Capacitance		--	110	--	pF
Rg	Gate resistance	VGS=0V, VDS=-0V,f=1.0MHz	--	--	--	Ω
Switching Times						
td(on)	Turn-on Delay Time	VGS=-10V,VDS=-10V, ID=-5A,RGEN=3Ω	--	15	--	nS
tr	Turn-on Rise Time		--	35	--	nS
td(off)	Turn-Off Delay Time		--	30	--	nS
tf	Turn-Off Fall Time		--	14	--	nS
Qg	Total Gate Charge	VGS=-10V, VDS=-10V, ID=-5A	--	18	--	nC
Qgs	Gate-Source Charge		--	1.5	--	nC
Qgd	Gate-Drain Charge		--	2.5	--	nC
Source-Drain Diode Characteristics						
ISD	Source-Drain Current(Body Diode)		--	--	-5.6	A
VSD	Forward on Voltage	VGS=0V,IS=-4A	--	--	-1.2	V
trr	Reverse Recovery Time	IF=-4A , dI/dt=100A/μs ,TJ=25℃	--	--	--	ns
Qrr	Reverse Recovery Charge		--	--	--	nc

Notes 1.The maximum current rating is package limited.

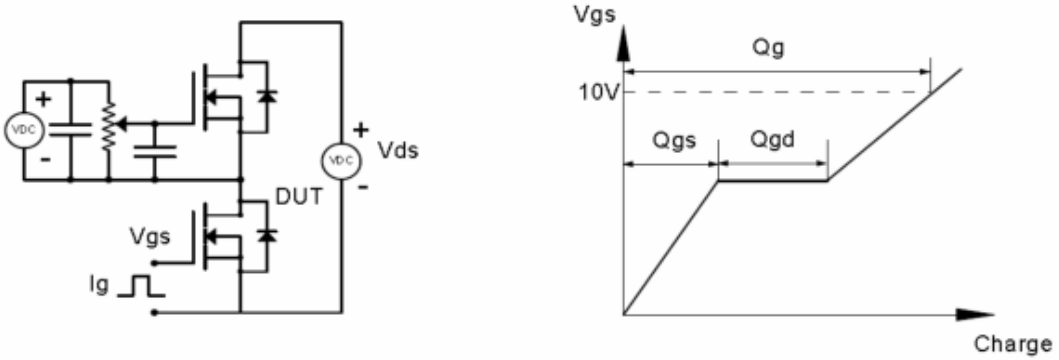
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

Notes 3.EAS condition: TJ=25℃,VDD=-15V,Vgs=-10V,ID=-8A, L=0.5mH,RG=25ohm

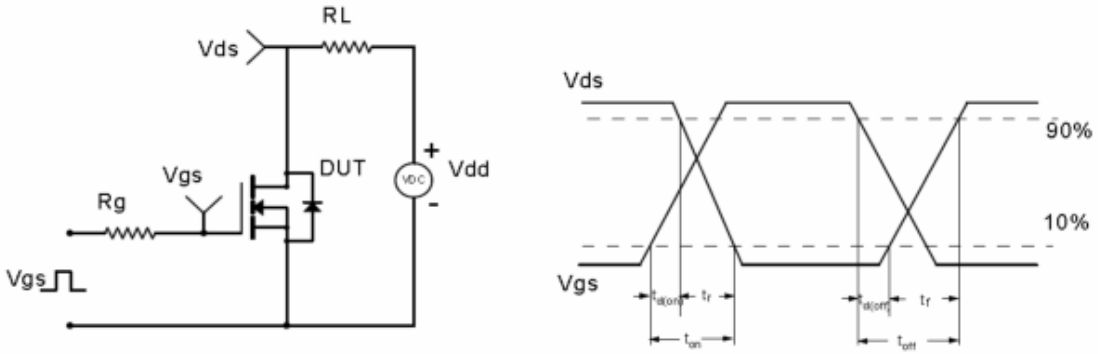
N-Channel Typical Characteristics

Test Circuit & Waveform

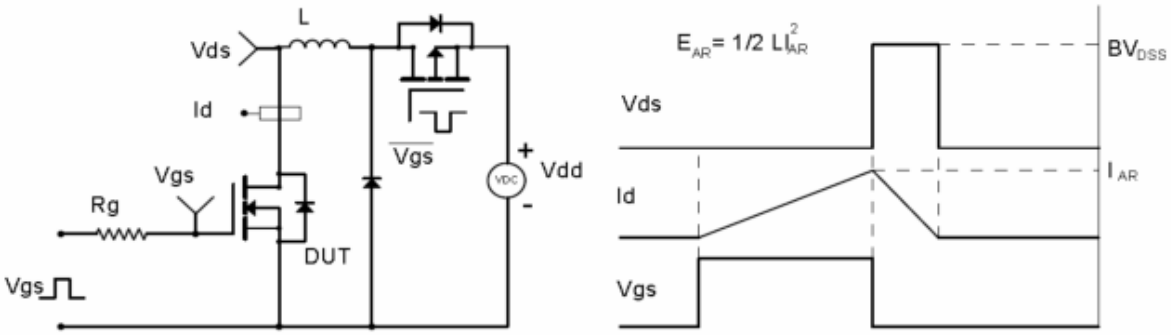
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

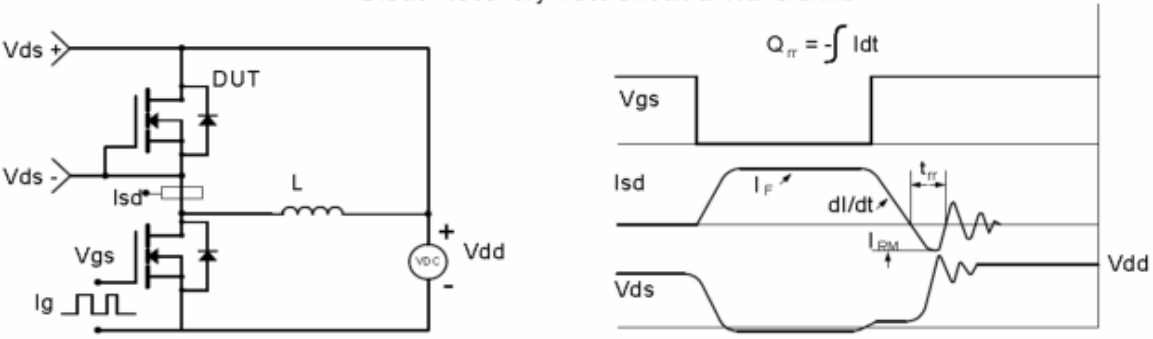


Figure1: Output Characteristics

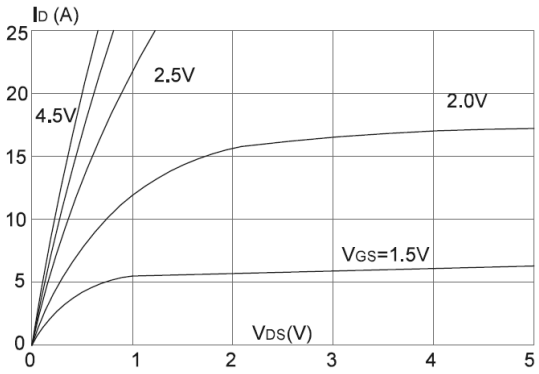


Figure 2: Typical Transfer Characteristics

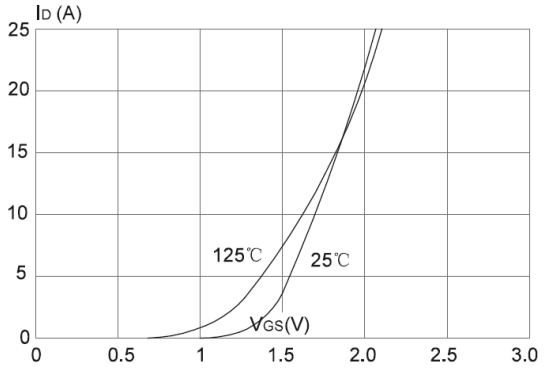


Figure 3: On-resistance vs. Drain Current

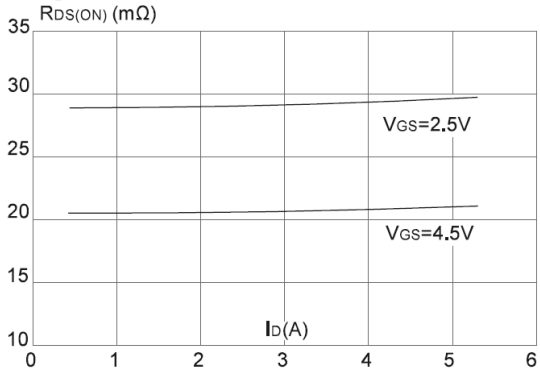


Figure 4: Body Diode Characteristics

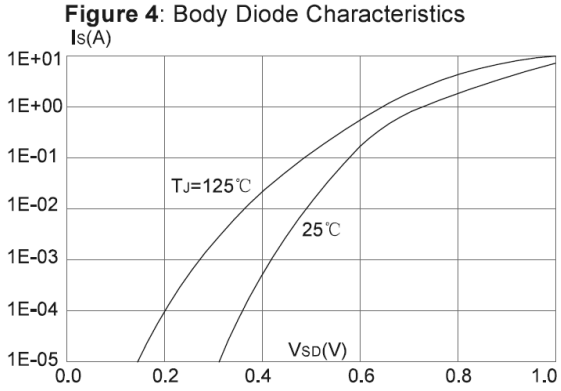


Figure 5: Gate Charge Characteristics

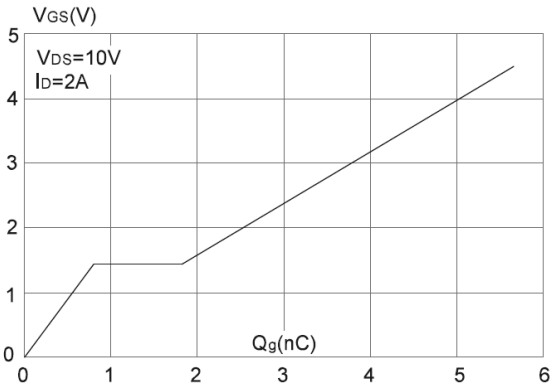


Figure 6: Capacitance Characteristics

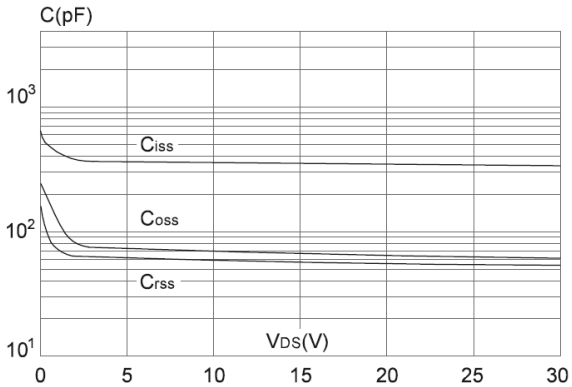


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

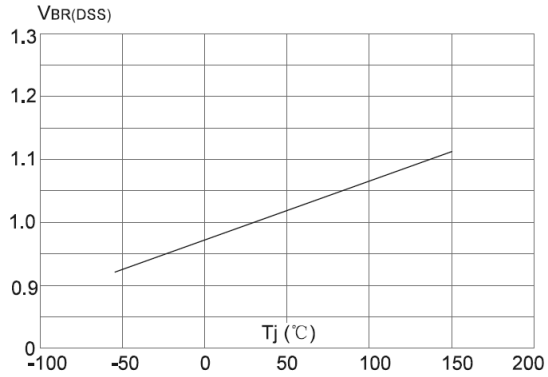


Figure 8: Normalized on Resistance vs. Junction Temperature

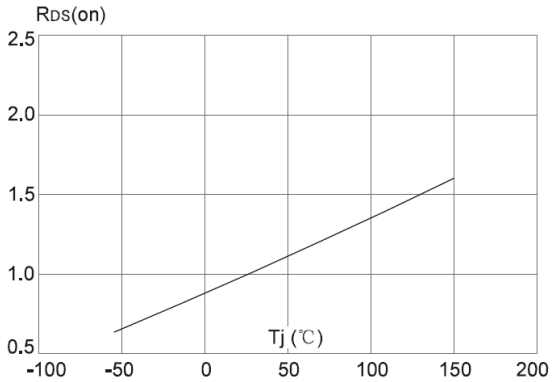


Fig.9 Maximum Continuous Drain Current VS. Ambient Temperature

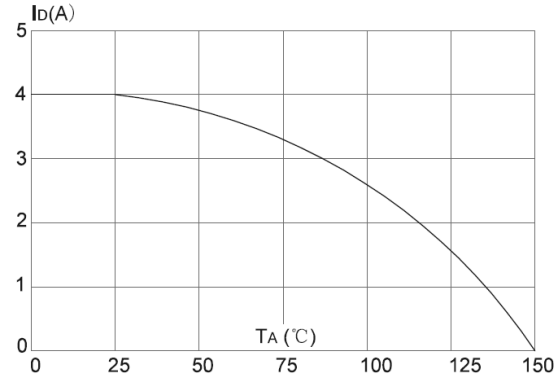


Fig.10 Maximum Safe Operating Area

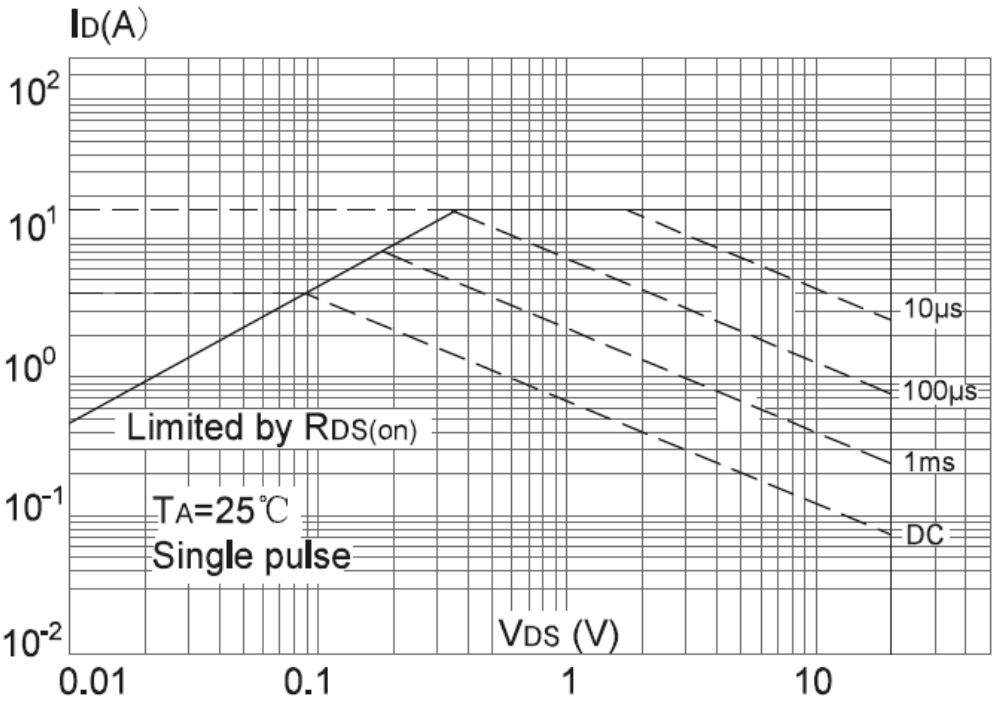
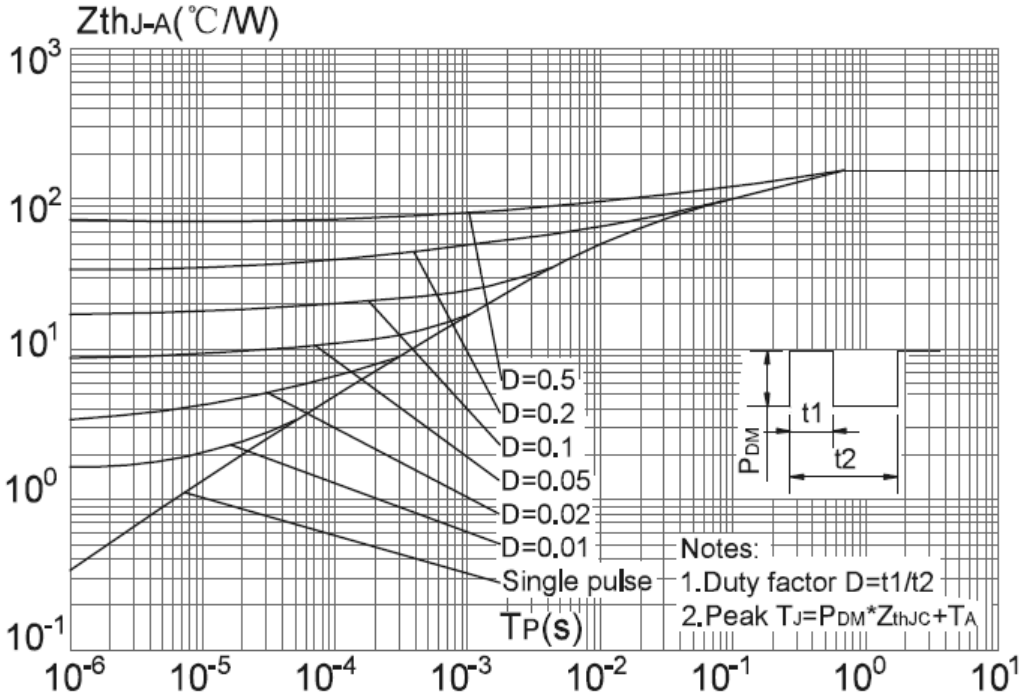
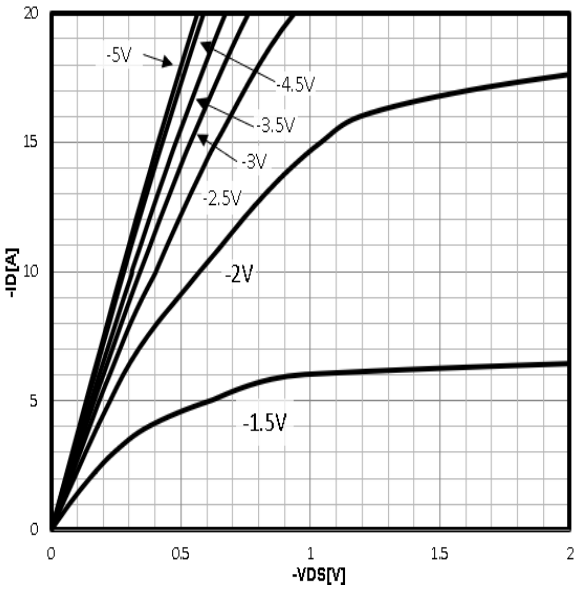


Fig. 11 Maximum Effective Transient Thermal Impedance , Junction-to-Ambient

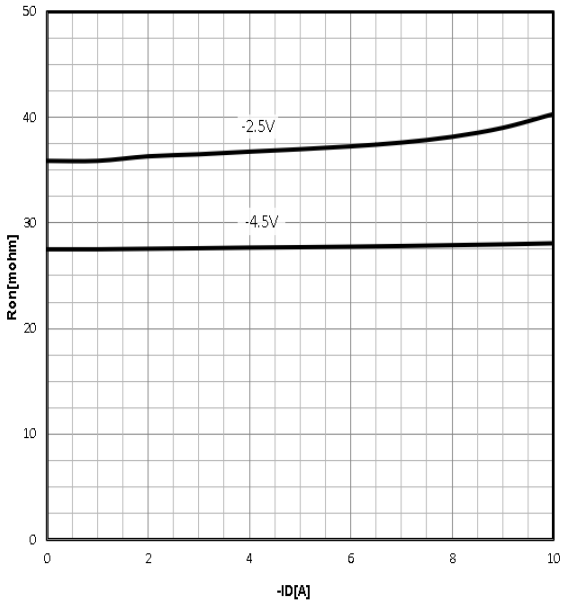


P-Channel Typical Characteristics Curve:

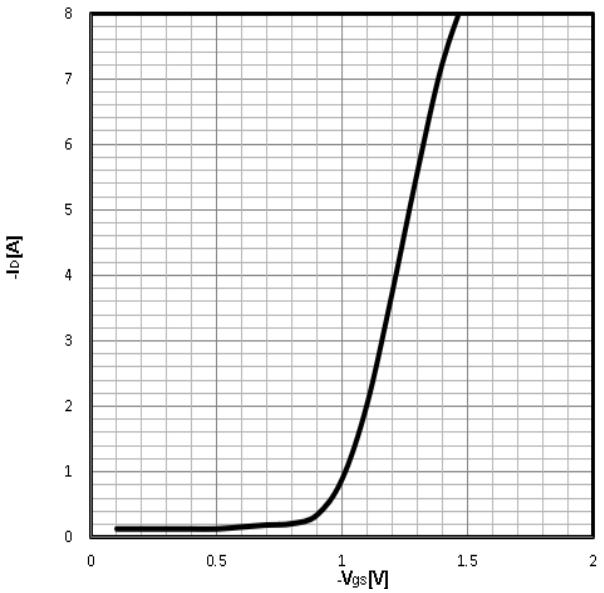
Typ. output characteristics
$I_D=f(V_{DS})$



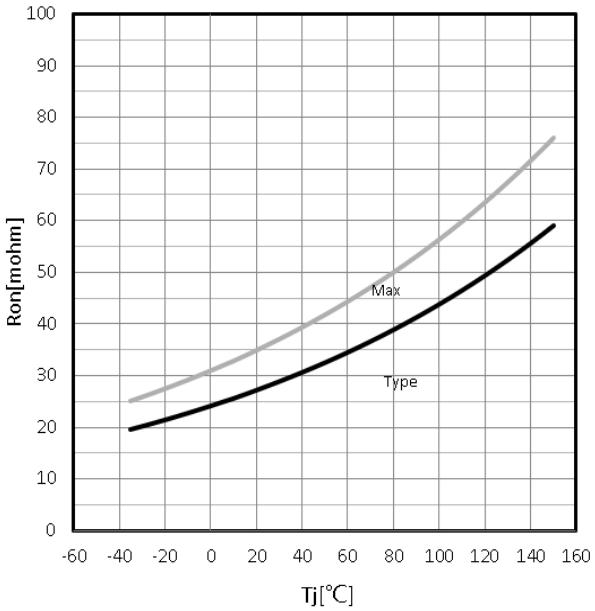
Typ. drain-source on resistance
$R_{DS(on)}=f(I_D)$



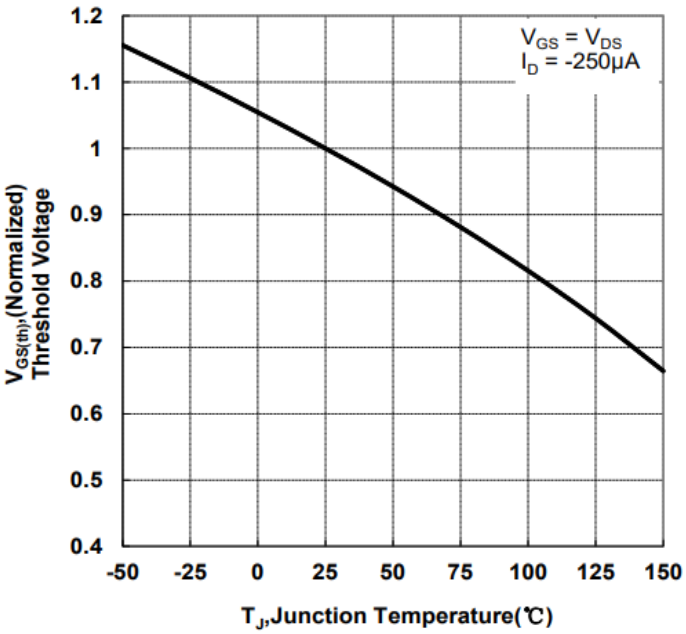
Typ. transfer characteristics
$I_D=f(V_{GS})$



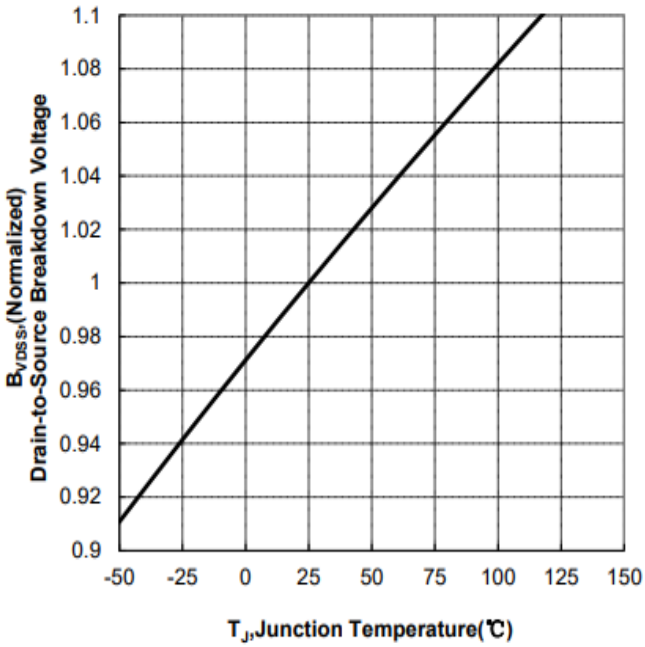
Drain-source on-state resistance
$R_{DS(on)}=f(T_j)$;I_D=-4A; V_{GS}=-4.5V



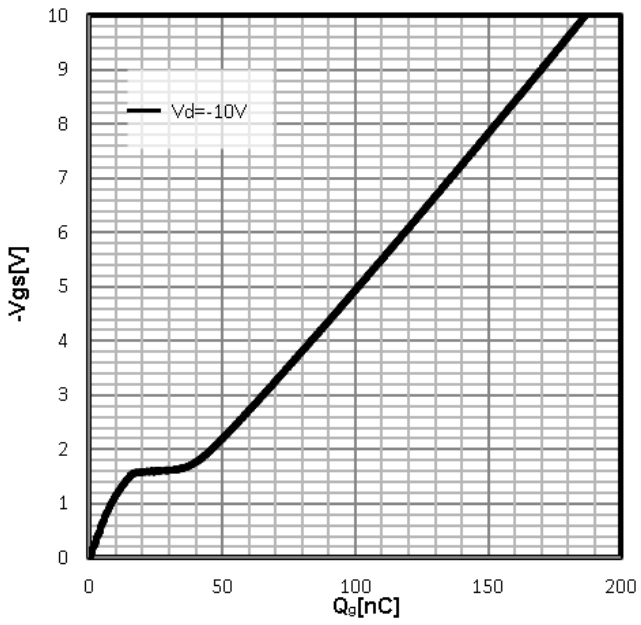
Gate Threshold Voltage
$-V_{TH}=f(T_j)$; I_D=-250uA



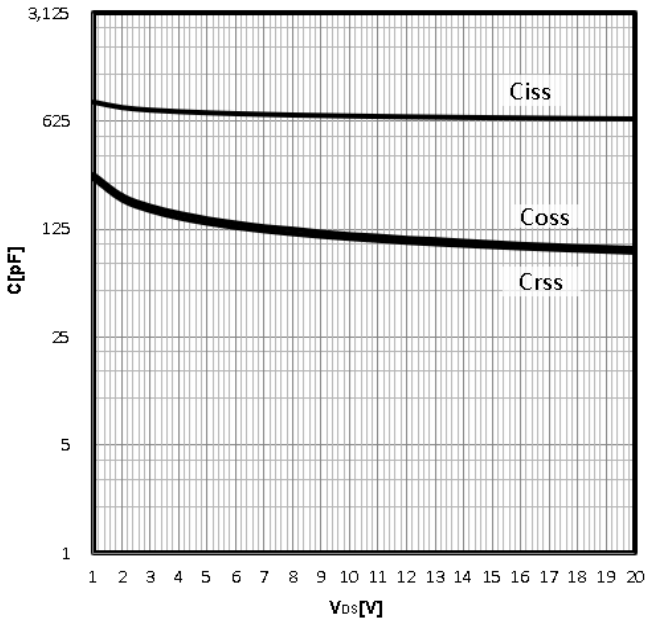
Drain-source breakdown voltage
$V_{BR(DSS)}=f(T_j)$; I_D=-250uA



Typ. gate charge
$V_{GS}=f(Q_{gate})$; I_D=-5A

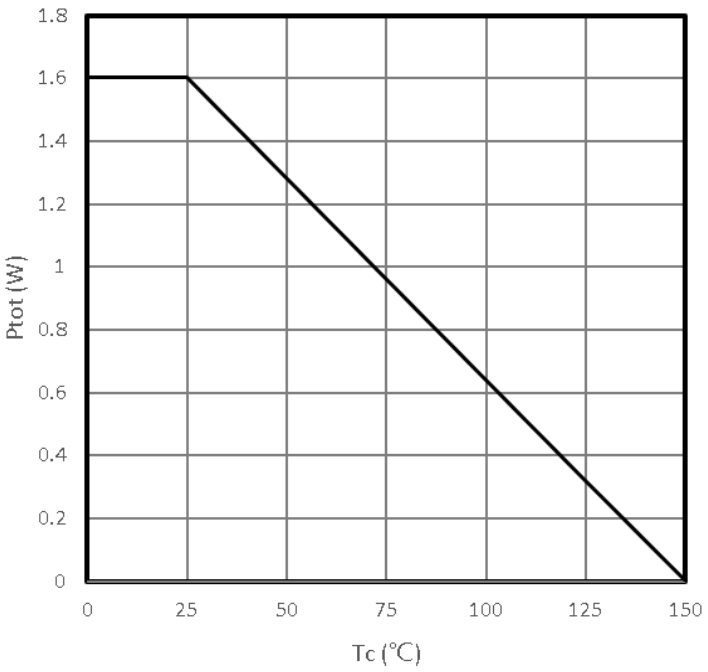


Typ. capacitances
C =f(V_{DS}); V_{GS}=0V; f =1MHz



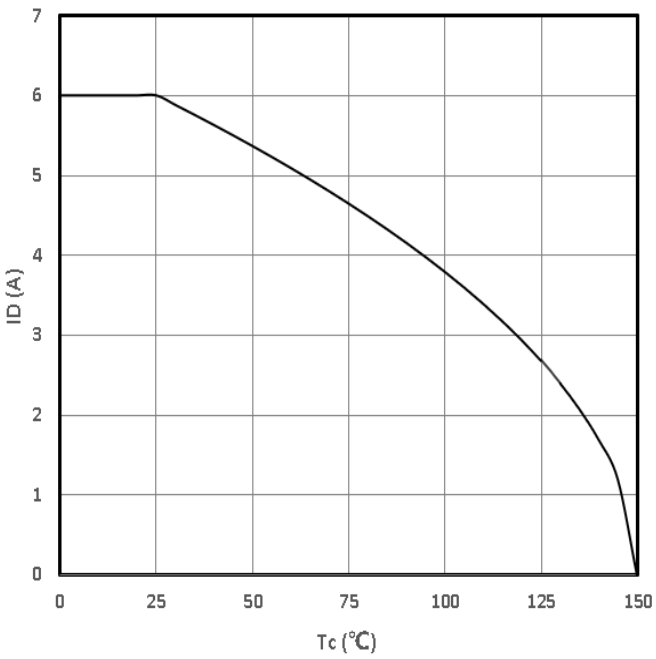
Power Dissipation

$P_{tot}=f(T_C)$



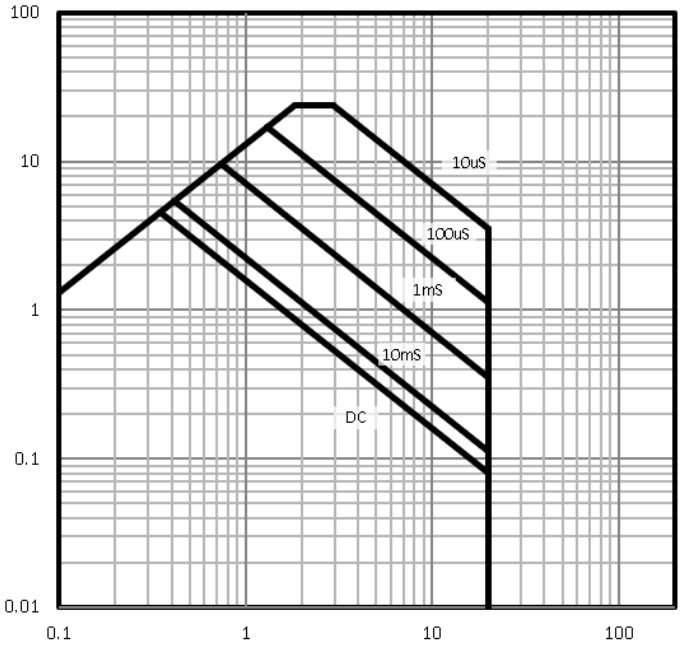
Maximum Drain Current

$-I_D=f(T_C)$



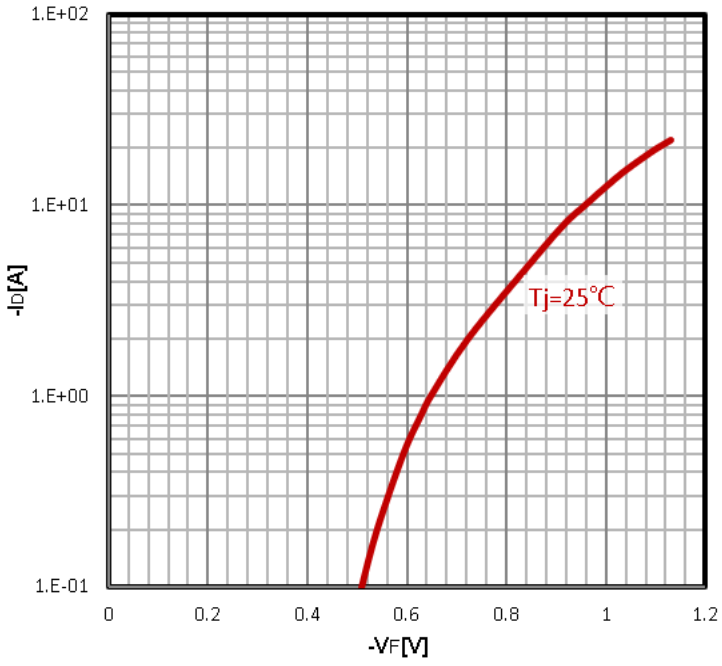
Safe operating area

$-I_D=f(-V_{DS})$



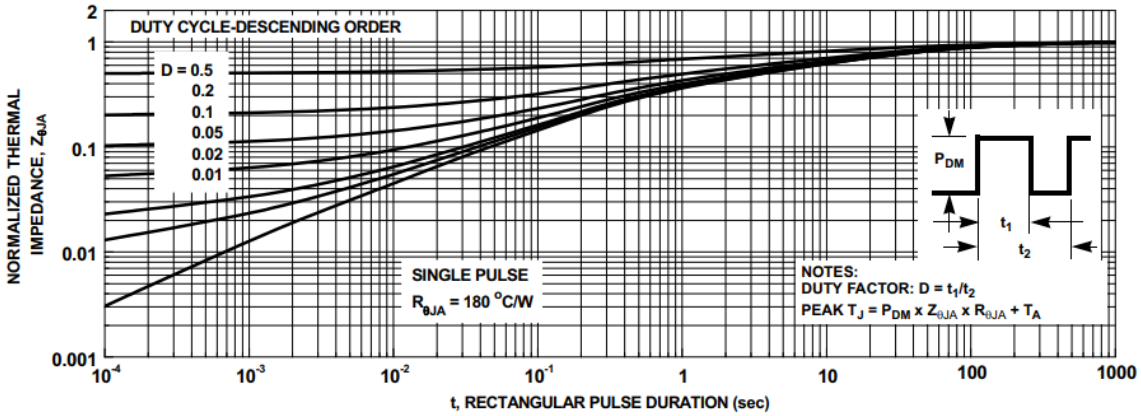
Body Diode Forward Voltage Variation

$-I_F=f(-V_{DS})$

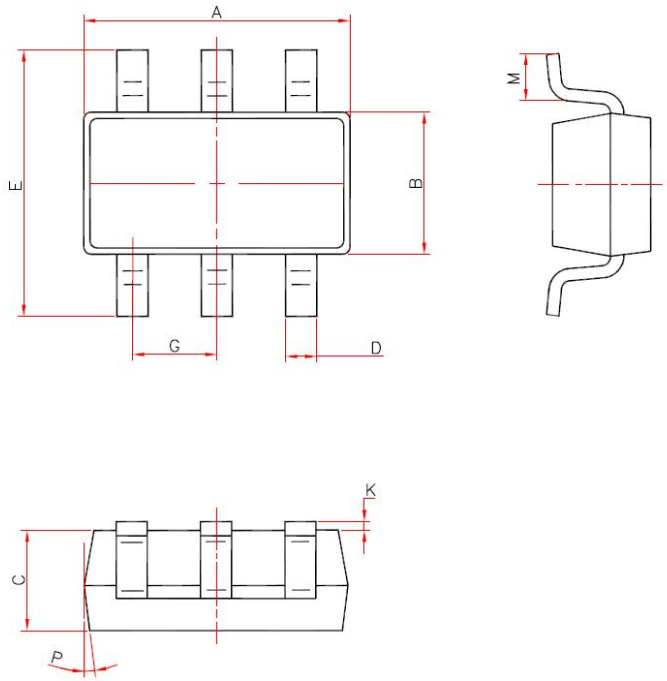


Max. transient thermal impedance

$Z_{thJC}=f(t_p)$



Package Outline Data SOT-23-6



DIM	MILLIMETERS
A	2.82~3.02
B	1.60 ± 0.10
C	1.10 ± 0.05
D	0.40 ± 0.10
E	2.65~2.95
G	0.95typ
K	0.00~0.10
M	0.20MIN
P	9 ± 2°

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This document is the third version issued on Dec.20th, 2023. This document replaces all previously provided information.