

### • General Description

The AGM312M2 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

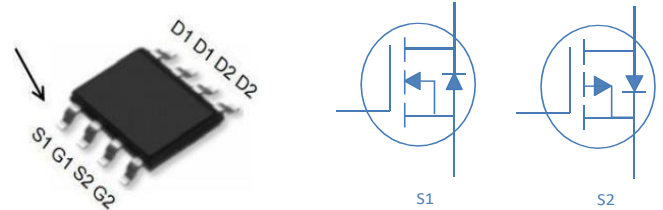
### • Application

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

### Product Summary

BVDSS	RDSON	ID
30V	18mΩ	9A
-30V	40mΩ	-6.8A

### SOP-8 Pin Configuration



### Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
AGM312M2	AGM312M2	SOP8	--mm	--mm	3000

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

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	30	-30	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	±20	±20	V
$I_D$	Drain Current-Continuous( $T_c=25^\circ C$ ) (Note 1)	9	-6.8	A
	Drain Current-Continuous( $T_c=70^\circ C$ )	7.65	-5.78	A
IDM (pluse)	Drain Current-Continuous@ Current-Pulsed (Note 2)	40	-40	A
$P_D$	Total Power Dissipation( $T_c=25^\circ C$ )	3.1	3.2	W
	Total Power Dissipation( $T_c=70^\circ C$ )	0.7	0.7	W
EAS	Avalanche energy (Note 3)	1.28	1.28	mJ
TJ,TSTG	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	°C

**Table 2. Thermal Characteristic**

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>	---	62.5	°C/W
$R_{\theta JC}$	Thermal Resistance Junction-Case <sup>1</sup>	---	--	°C/W

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

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=250μA	30	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=30V,VGS=0V	--	--	1	μA
IGSS	Gate-Body Leakage Current	VGS=±12V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=250μA	1.0	--	2.0	V
gFS	Forward Transconductance	VDS=15V,ID=6.8A	--	27	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=10V, ID=6.8A	--	18	--	mΩ
		VGS=4.5V, ID=6.6A	--	24	21	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=20V,VGS=0V, F=1MHZ	--	510	--	pF
Coss	Output Capacitance		--	95	--	pF
Crss	Reverse Transfer Capacitance		--	33	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	0.3	1.1	2.3	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	VGS=10V,VDS=20V, ID=5.4A, RGEN=1Ω, RL=3.7Ω	--	4	8	nS
tr	Turn-on Rise Time		--	10	17	nS
td(off)	Turn-Off Delay Time		--	16	22	nS
tf	Turn-Off Fall Time		--	5	9	nS
Qg	Total Gate Charge	VGS=4.5V, VDS=20V, ID=10A	--	5.8	7	nC
Qgs	Gate-Source Charge		--	1.6	--	nC
Qgd	Gate-Drain Charge		--	1.4	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	2.6	A
VSD	Forward on Voltage	VGS=0V,IS=5.4A	--	0.81	1.2	V
trr	Reverse Recovery Time	IF=5A , dI/dt=100A/μs , TJ=25°C	--	12	25	ns
Qrr	Reverse Recovery Charge		--	10	17	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°C

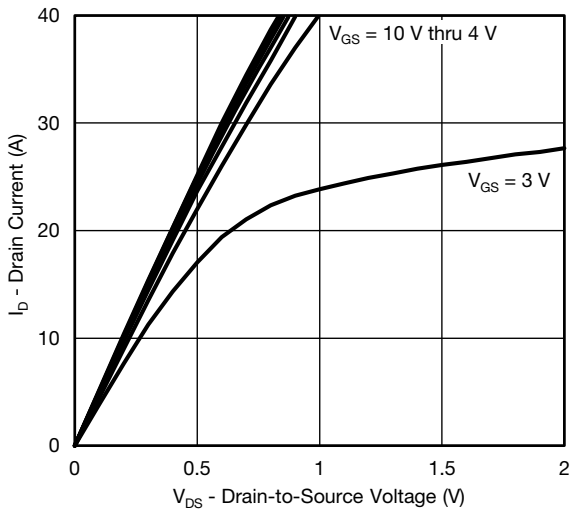
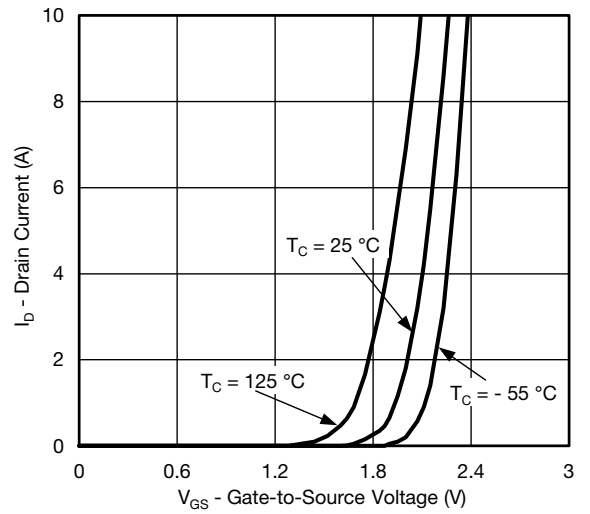
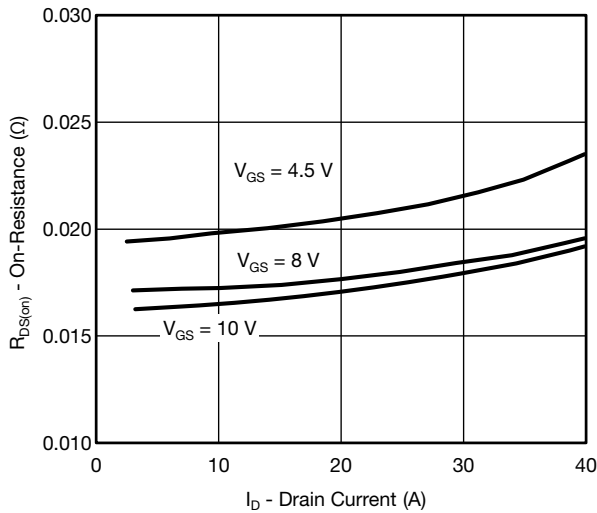
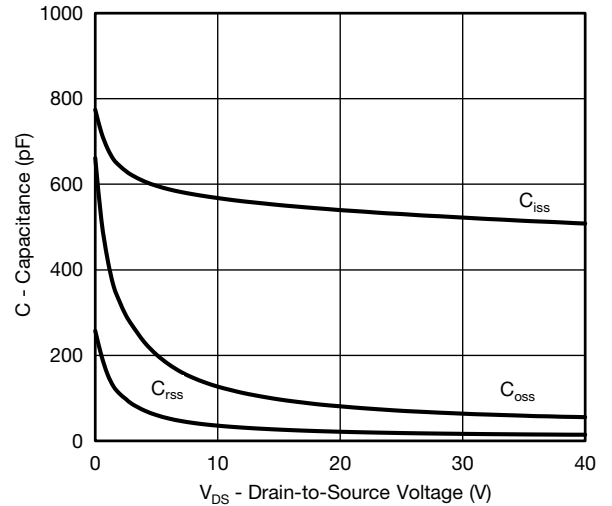
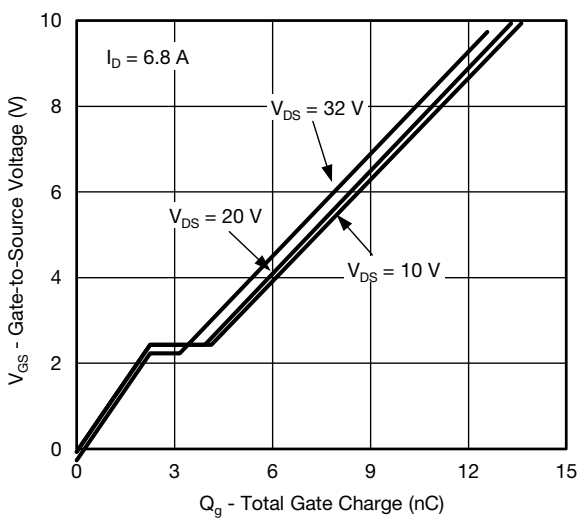
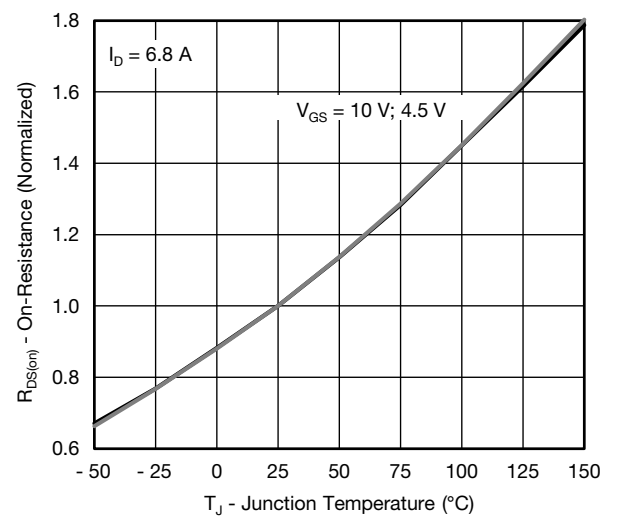
**Table 3. P-Channel Electrical Characteristics (TA=25°C unless otherwise noted)**

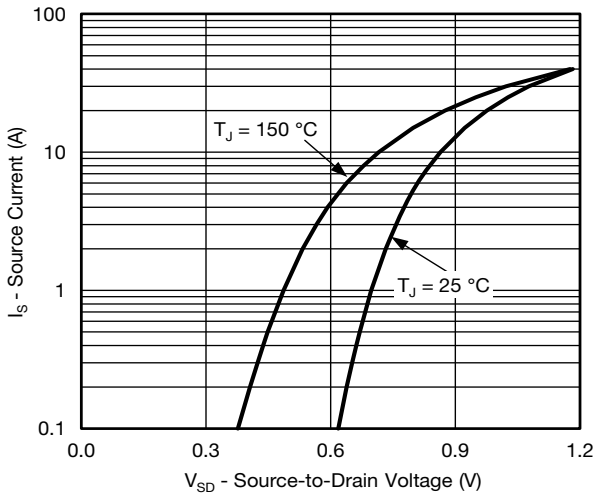
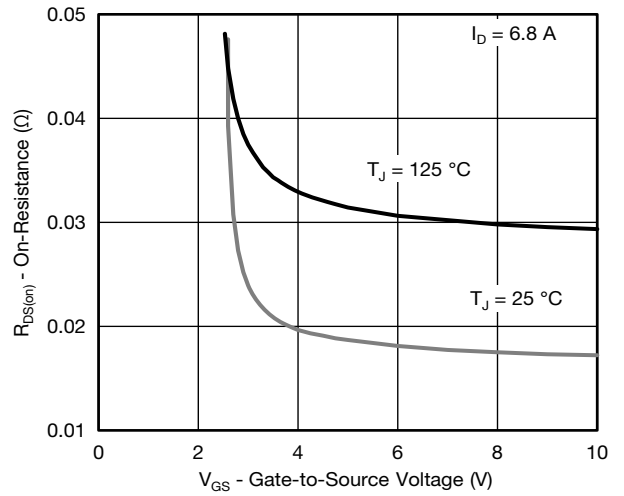
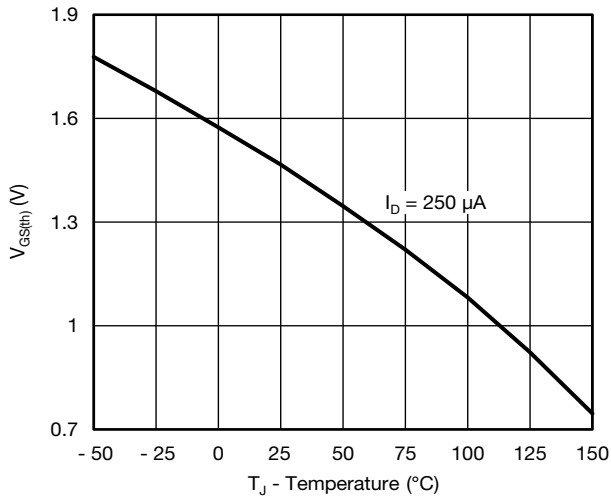
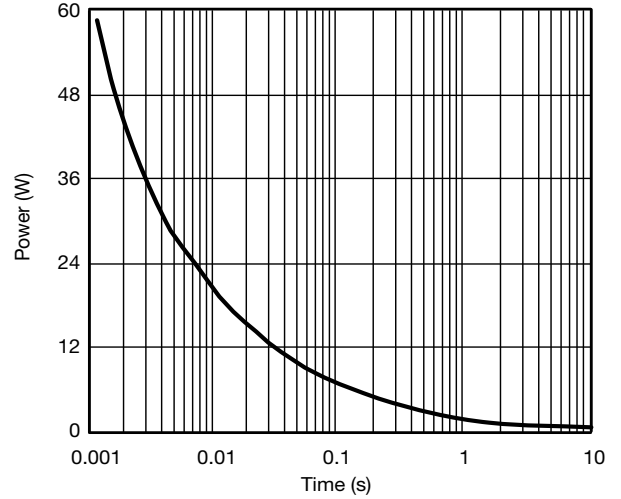
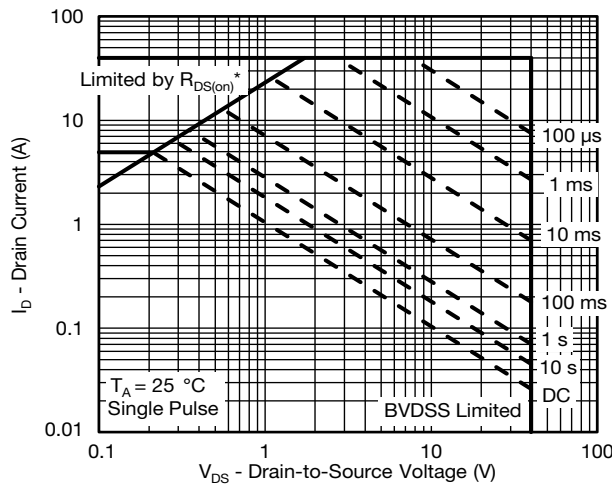
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BVDSS	Drain-Source Breakdown Voltage	VGS=0V ID=-250μA	-30	--	--	V
IDSS	Zero Gate Voltage Drain Current	VDS=-30V,VGS=0V	--	--	-1	μA
IGSS	Gate-Body Leakage Current	VGS=±12V,VDS=0V	--	--	±100	nA
VGS(th)	Gate Threshold Voltage	VDS=VGS,ID=-250μA	-1.0	--	-2.0	V
gFS	Forward Transconductance	VDS=-15V,ID=-6.7A	--	-25	--	S
RDS(on)	Drain-Source On-State Resistance	VGS=-10V, ID=-8A	--	40	--	mΩ
		VGS=-4.5V, ID=-5A	--	50	--	mΩ
<b>Dynamic Characteristics</b>						
Ciss	Input Capacitance	VDS=-20V,VGS=0V, F=1MHZ	--	620	--	pF
Coss	Output Capacitance		--	115	--	pF
Crss	Reverse Transfer Capacitance		--	57	--	pF
Rg	Gate resistance	VGS=0V, VDS=0V,f=1.0MHz	1.2	5.7	9.6	Ω
<b>Switching Times</b>						
td(on)	Turn-on Delay Time	VGS=-10V,VDS=-20V, ID=-10A,RGEN=1Ω RL=2Ω	--	10	--	nS
tr	Turn-on Rise Time		--	9	--	nS
td(off)	Turn-Off Delay Time		--	23	--	nS
tf	Turn-Off Fall Time		--	10	--	nS
Qg	Total Gate Charge	VGS=-4.5V, VDS=-20V, ID=-10A	--	16	22	nC
Qgs	Gate-Source Charge		--	4.3	--	nC
Qgd	Gate-Drain Charge		--	7	--	nC
<b>Source-Drain Diode Characteristics</b>						
ISD	Source-Drain Current(Body Diode)		--	--	-2.6	A
VSD	Forward on Voltage	VGS=0V,IS=-2A	--	-0.77	-1.2	V
trr	Reverse Recovery Time	IF=-5A , dl/dt=100A/μs , TJ=25°C	--	31	57	ns
Qrr	Reverse Recovery Charge		--	29	47	nc

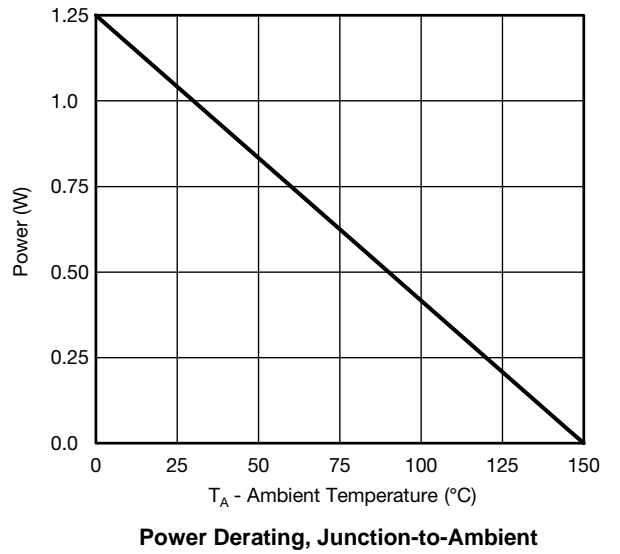
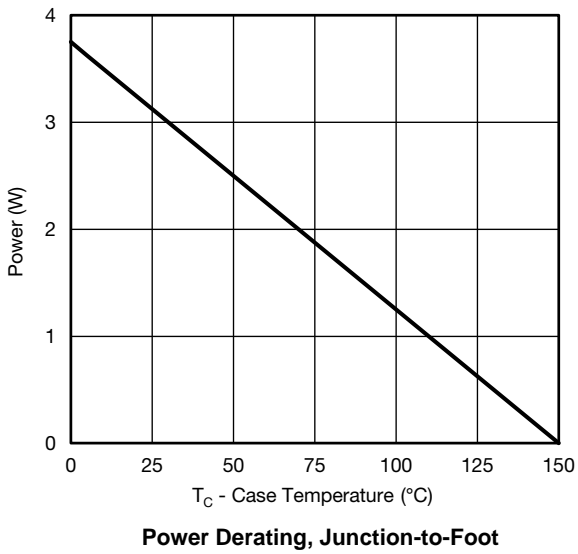
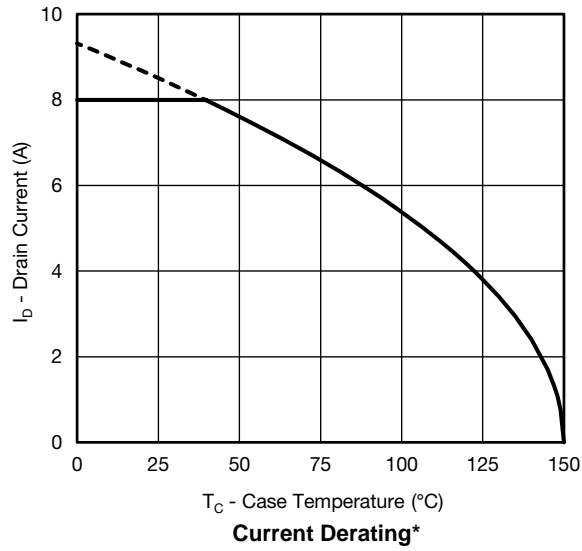
Notes 1.The maximum current rating is package limited.

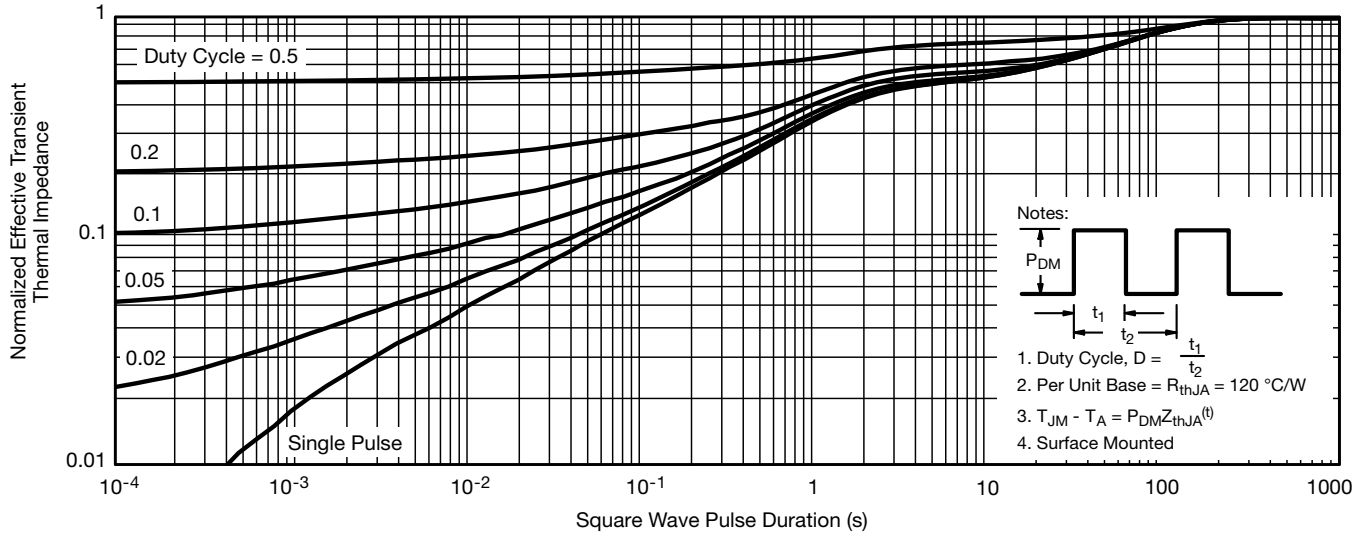
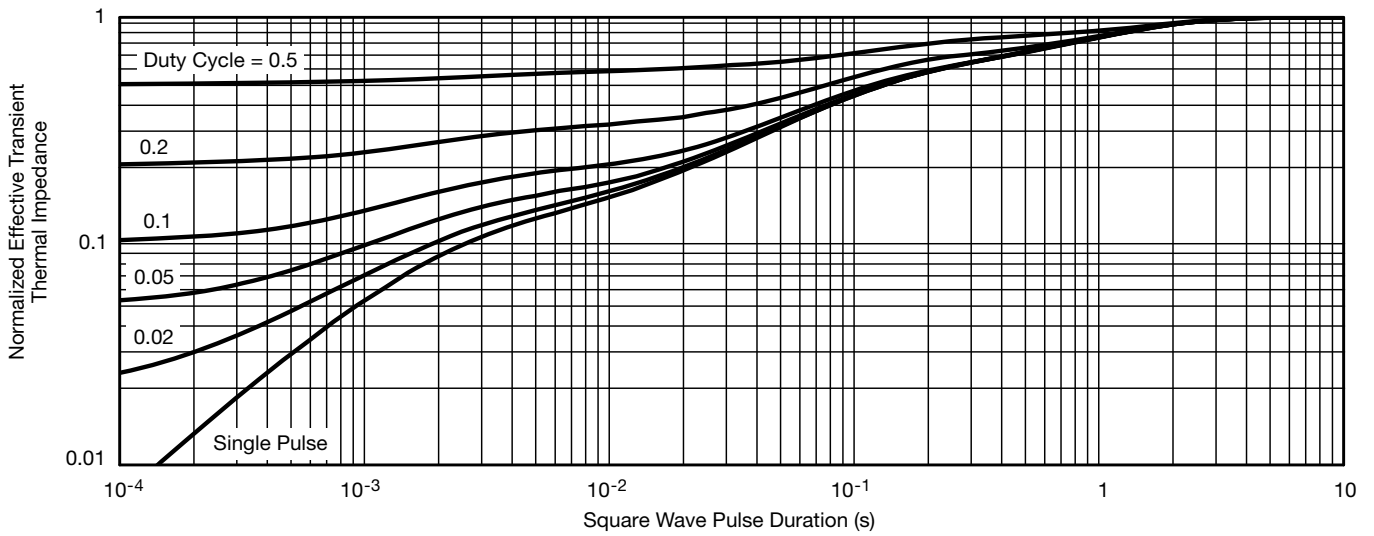
Notes 2.Repetitive Rating: Pulse width limited by maximum junction temperature

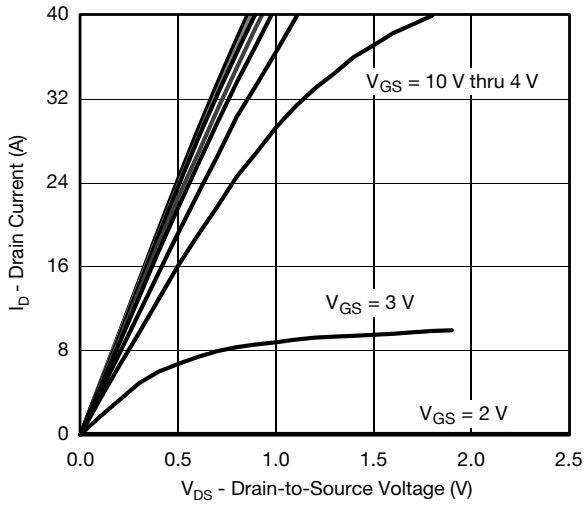
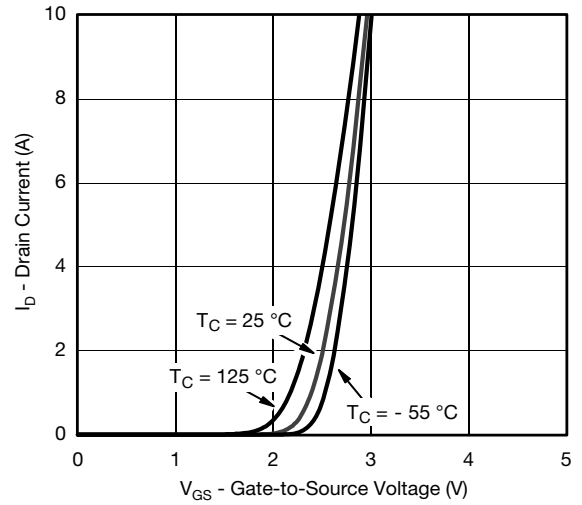
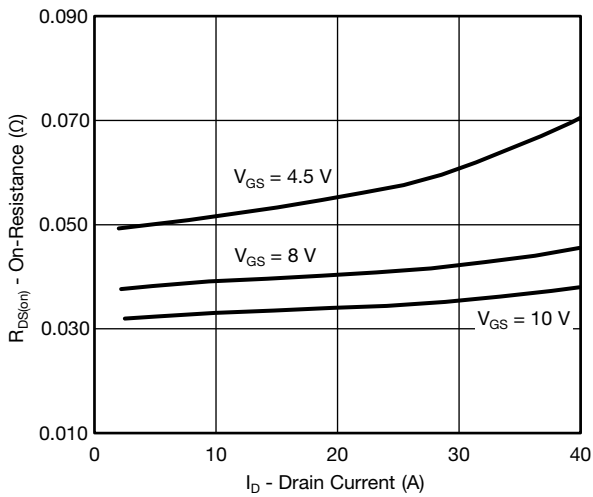
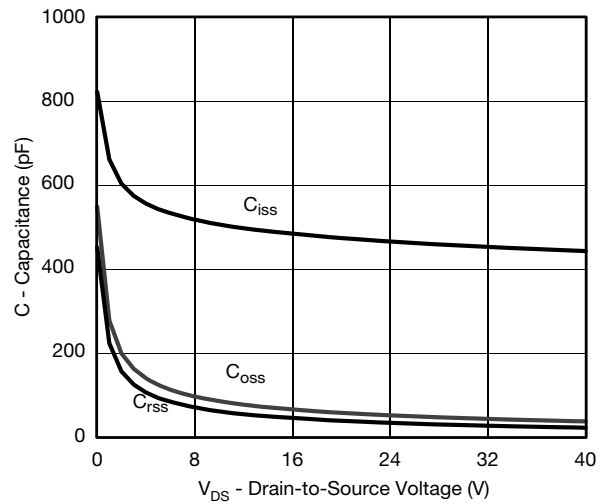
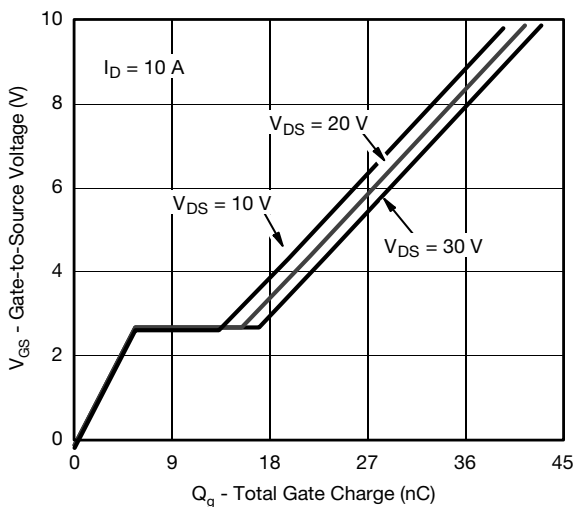
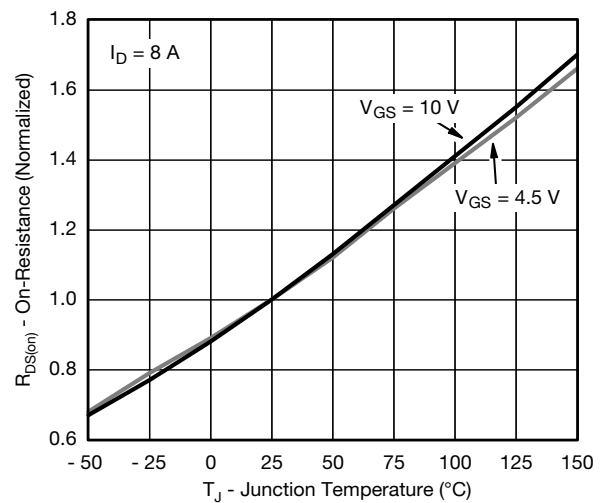
Notes 3.EAS condition: TJ=25°C

**N-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Output Characteristics**

**Transfer Characteristics**

**On-Resistance vs. Drain Current and Gate Voltage**

**Capacitance**

**Gate Charge**

**On-Resistance vs. Junction Temperature**

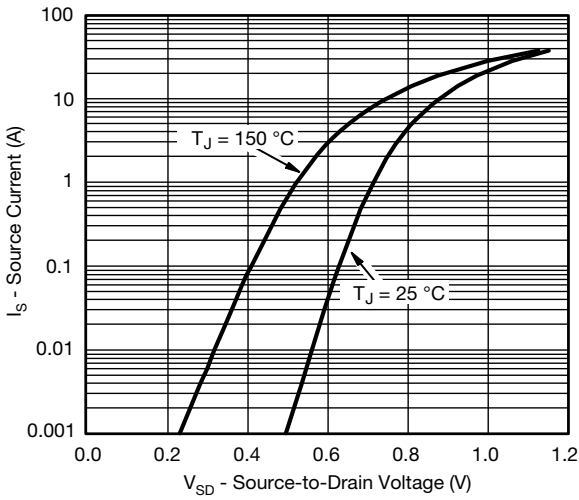
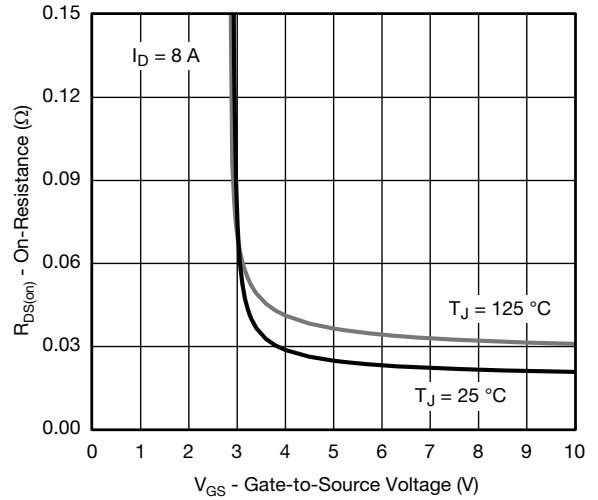
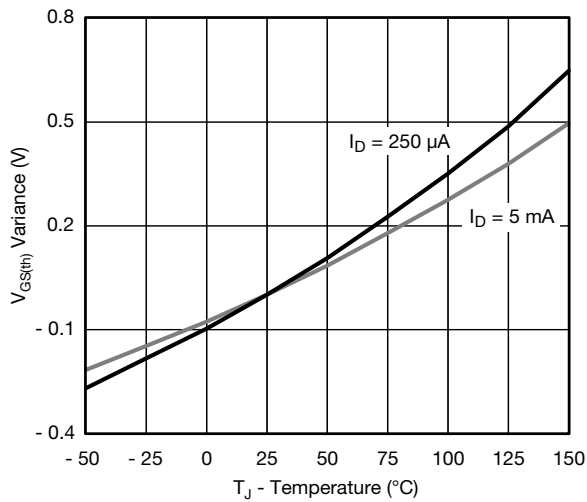
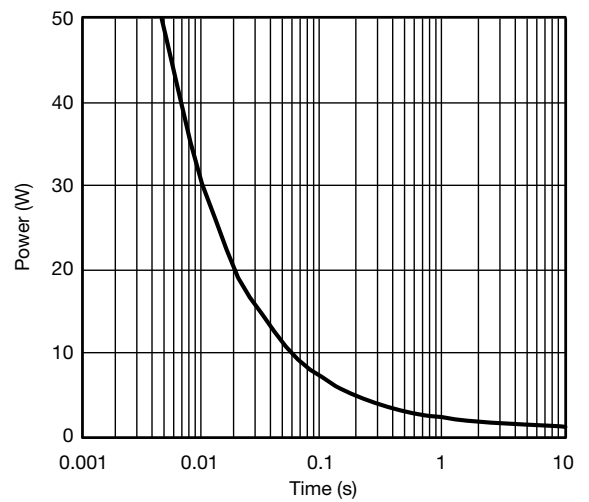
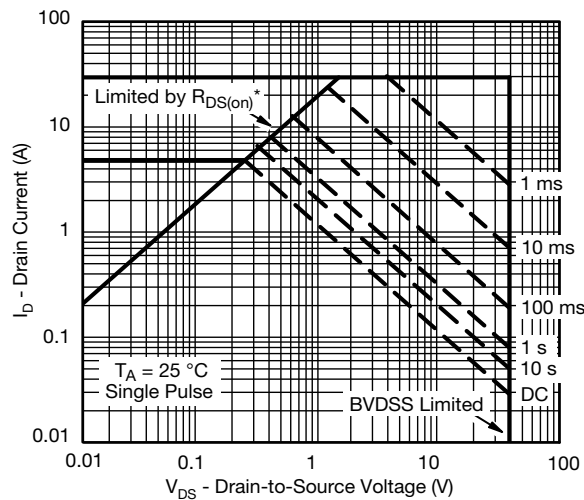
**N-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Source-Drain Diode Forward Voltage**

**On-Resistance vs. Gate-to-Source Voltage**

**Threshold Voltage**

**Single Pulse Power, Junction-to-Ambient**

**Safe Operating Area, Junction-to-Ambient**

**N-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)


**N-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**

**Normalized Thermal Transient Impedance, Junction-to-Ambient**

**Normalized Thermal Transient Impedance, Junction-to-Foot**

**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Output Characteristics**

**Transfer Characteristics**

**On-Resistance vs. Drain Current and Gate Voltage**

**Capacitance**

**Gate Charge**

**On-Resistance vs. Junction Temperature**

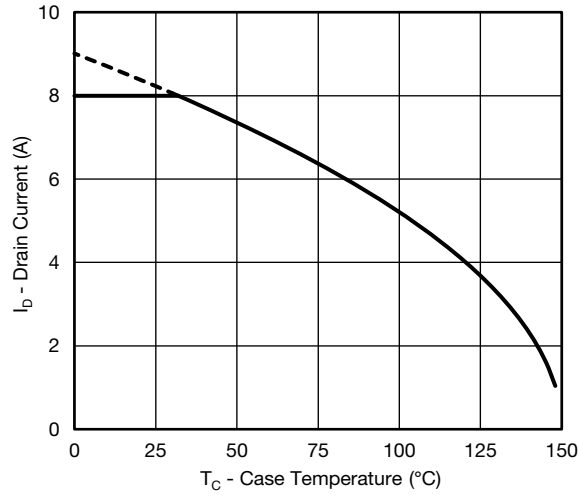


**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Source-Drain Diode Forward Voltage**

**On-Resistance vs. Gate-to-Source Voltage**

**Threshold Voltage**

**Single Pulse Power, Junction-to-Ambient**


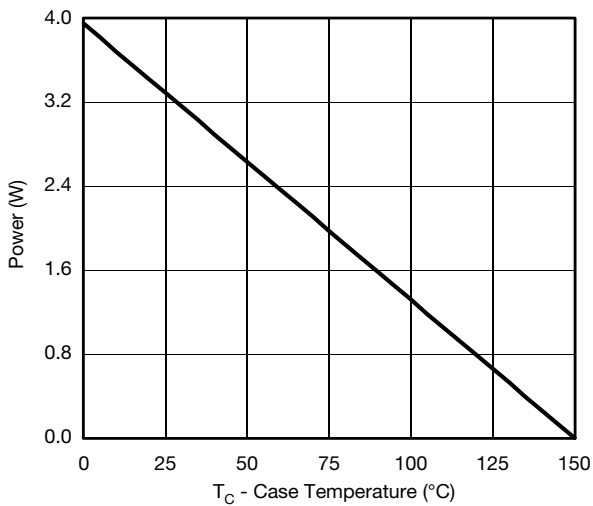
\*  $V_{GS} >$  minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

**Safe Operating Area, Junction-to-Ambient**

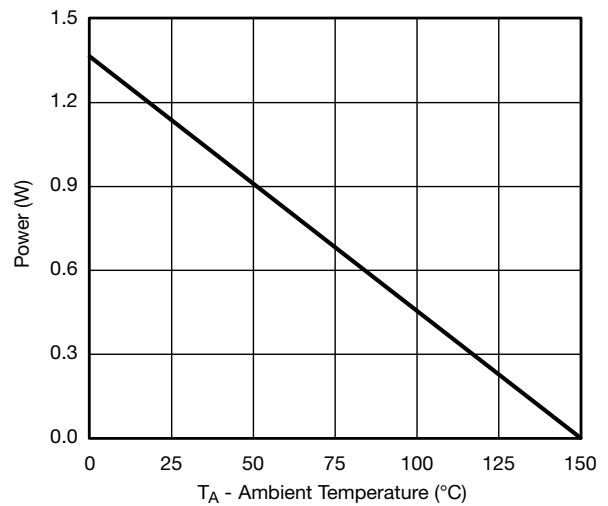
**P-CHANNEL TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)



**Current Derating\***

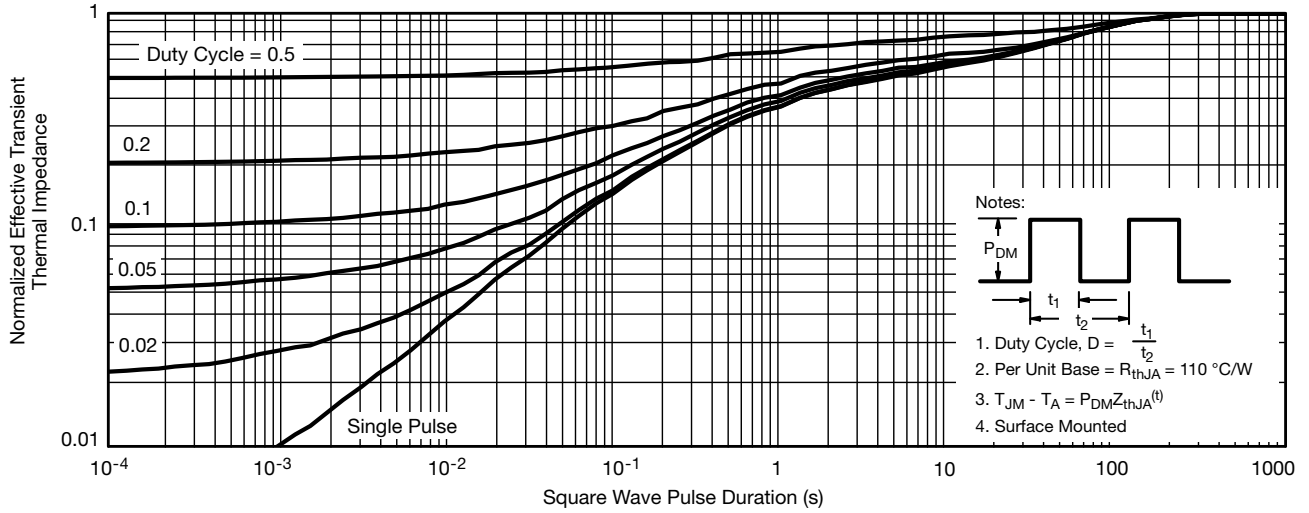
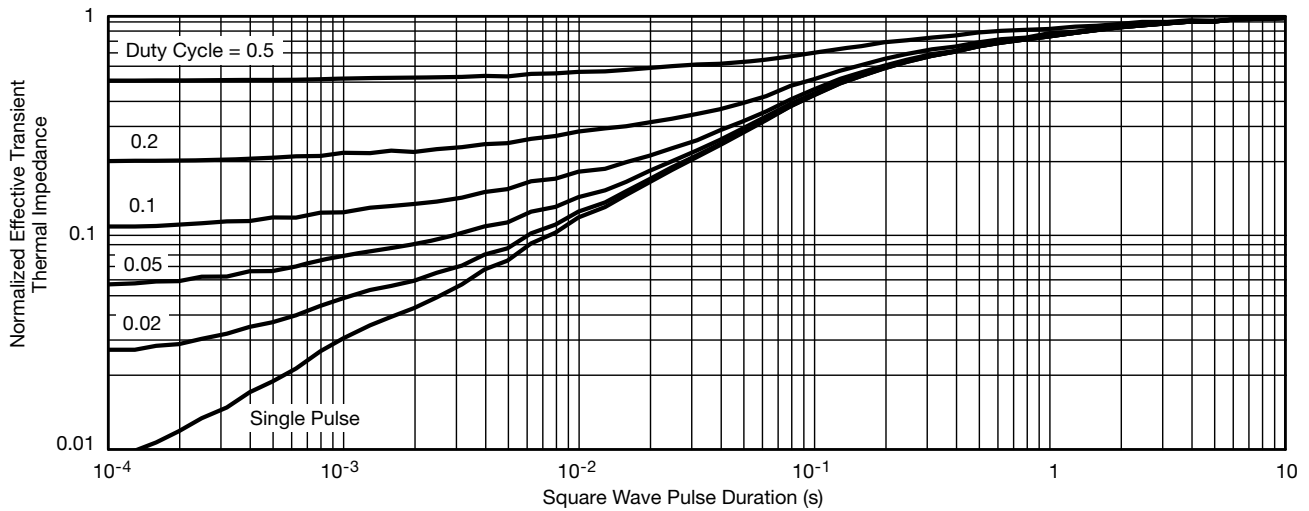


**Power Derating, Junction-to-Foot**



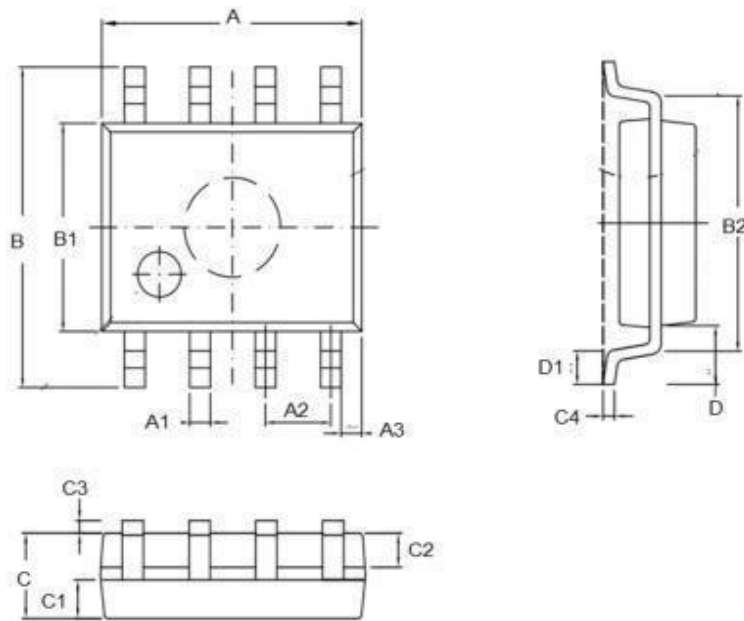
**Power Derating, Junction-to-Ambient**

\* The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

**P-CHANNEL TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)**

**Normalized Thermal Transient Impedance, Junction-to-Ambient**

**Normalized Thermal Transient Impedance, Junction-to-Foot**

**•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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