

N-Channel Trench Power MOSFET

General Description

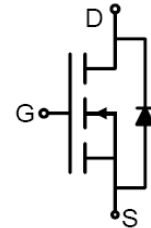
The PM2312 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a battery protection or in other switching application.

Features

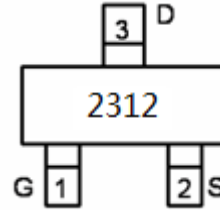
- $V_{DS} = 20V, I_D = 5A$
 $R_{DS(ON)} < 26m\Omega @ V_{GS} = 4.5V$
 $R_{DS(ON)} < 34m\Omega @ V_{GS} = 2.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

Application

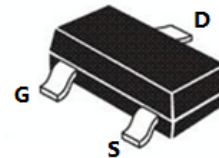
- Battery protection
- Load switch
- Power management



Schematic Diagram



Marking and pin Assignment



SOT-23 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
2312	PM2312	SOT-23	3000 units

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

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	20	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 12	V
I_D	Drain Current-Continuous	5	A
$I_{DM (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	16	A
P_D	Maximum Power Dissipation	1.3	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ C$

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature

Table 2. Thermal Characteristic

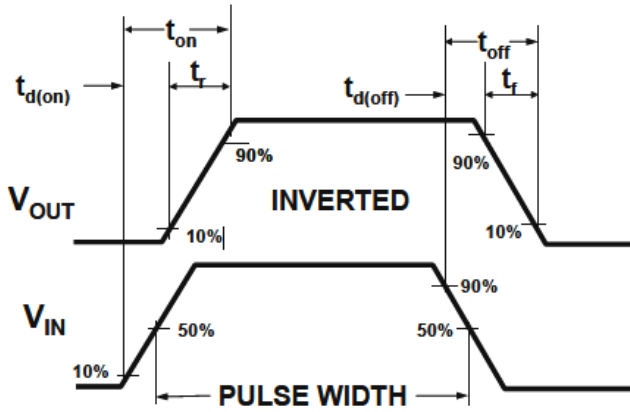
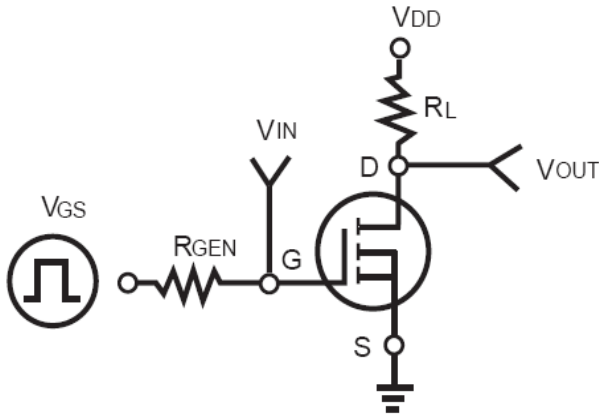
Symbol	Parameter	Value	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	96	$^\circ C/W$

Table 3. Electrical Characteristics (T_A=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
B _V DSS	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =250μA	20	22		V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =20V, V _{GS} =0V			1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±12V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250μA	0.5	0.7	1.1	V
g _{FS}	Forward Transconductance	V _{DS} =5V, I _D =4.5A	4	10		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =4.5V, I _D =5A		18	26	mΩ
		V _{GS} =2.5V, I _D =4A		23	34	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1.0MHz		900		pF
C _{oss}	Output Capacitance			128		pF
C _{rss}	Reverse Transfer Capacitance			97		pF
Switching Times						
t _{d(on)}	Turn-on Delay Time	V _{DD} =10V, I _D =1A, R _L =2.8Ω V _{GS} =4.5V, R _G =6Ω		20		nS
t _r	Turn-on Rise Time			19		nS
t _{d(off)}	Turn-Off Delay Time			65		nS
t _f	Turn-Off Fall Time			25		nS
Q _g	Total Gate Charge	V _{DS} =10V, I _D =5A, V _{GS} =4.5V		10		nC
Q _{gs}	Gate-Source Charge			2.3		nC
Q _{gd}	Gate-Drain Charge			2.9		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current(Body Diode)				5	A
V _{SD}	Forward on Voltage (Note 1)	V _{GS} =0V, I _S =5A			1.2	V

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Switch Time Test Circuit and Switching Waveforms



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Power Dissipation

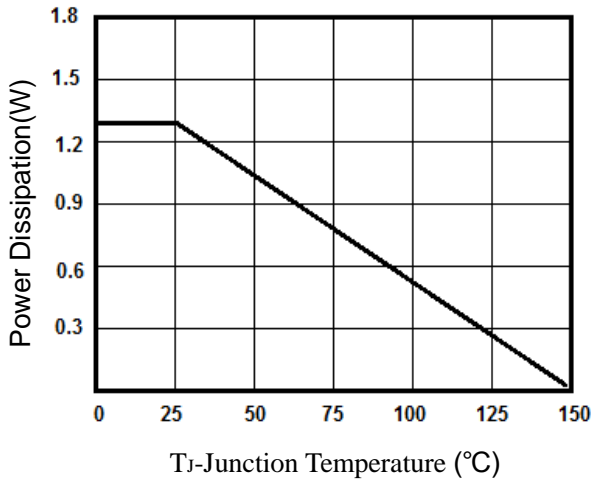


Figure2. Drain Current

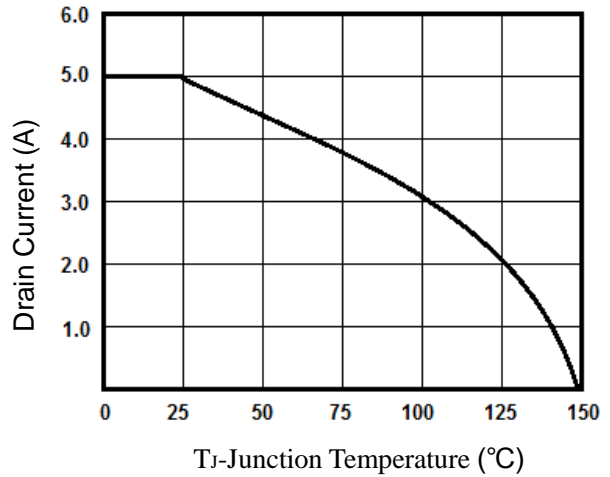


Figure3. Output Characteristics

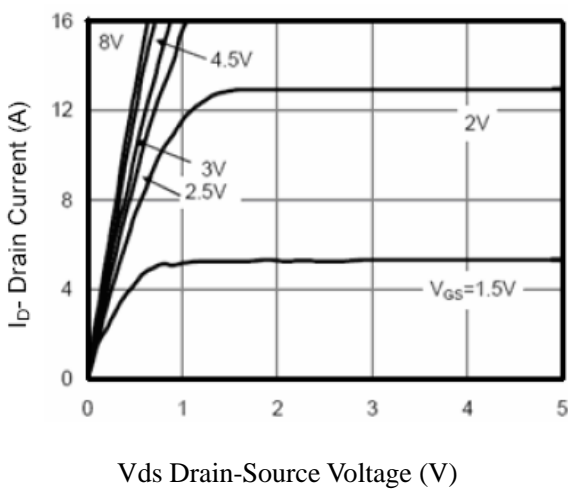


Figure4. Transfer Characteristics

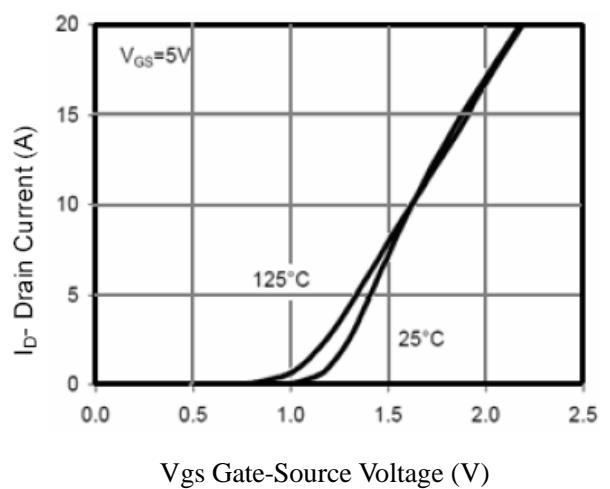


Figure5. Capacitance

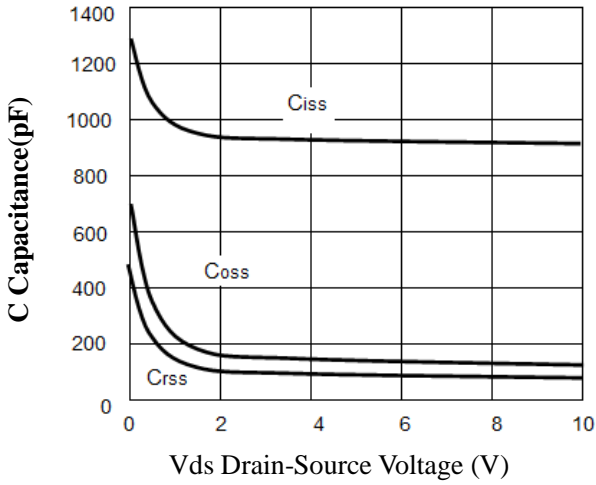


Figure6. $R_{DS(ON)}$ vs Junction Temperature

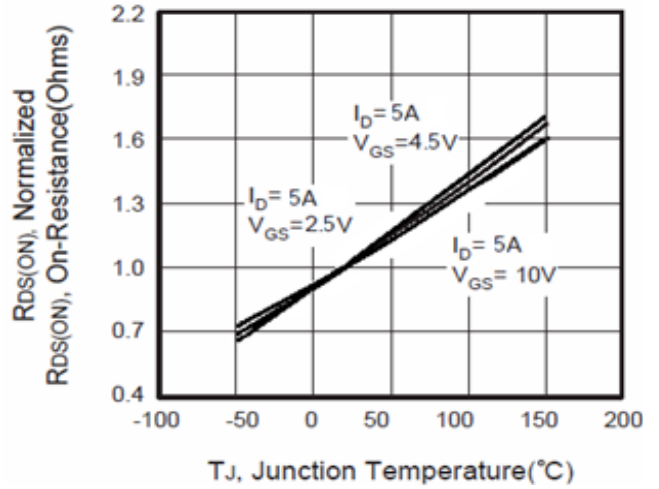


Figure7. Max BV_{DSS} vs Junction Temperature

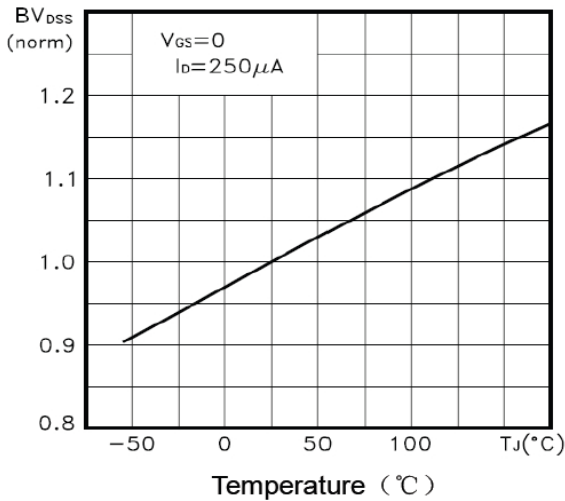


Figure8. $V_{GS(th)}$ vs Junction Temperature

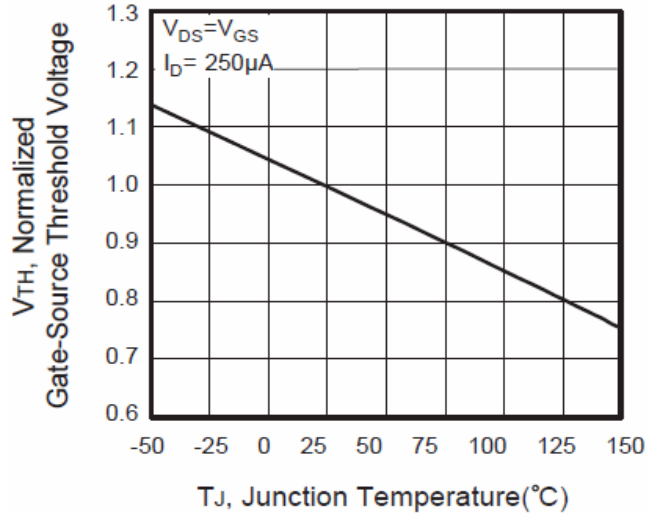


Figure9. Gate Charge Waveforms

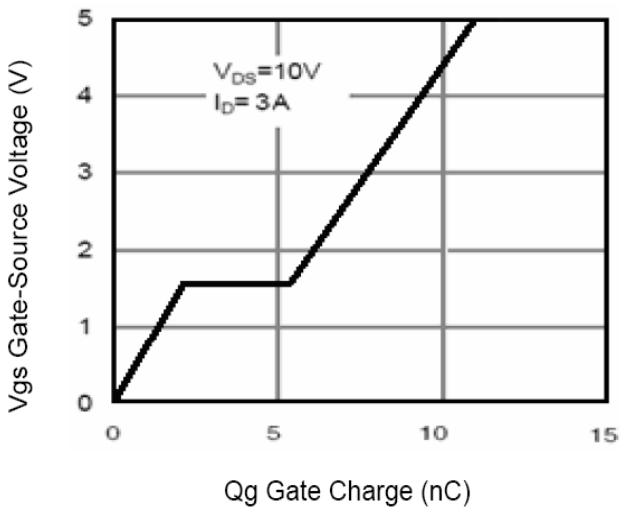


Figure10. Maximum Safe Operating Area

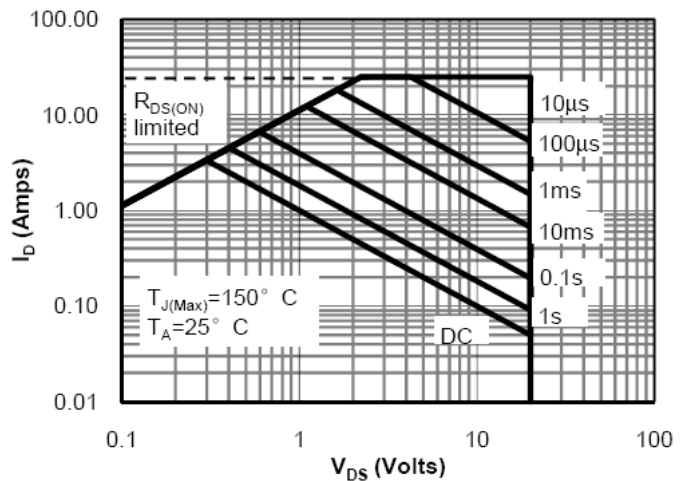
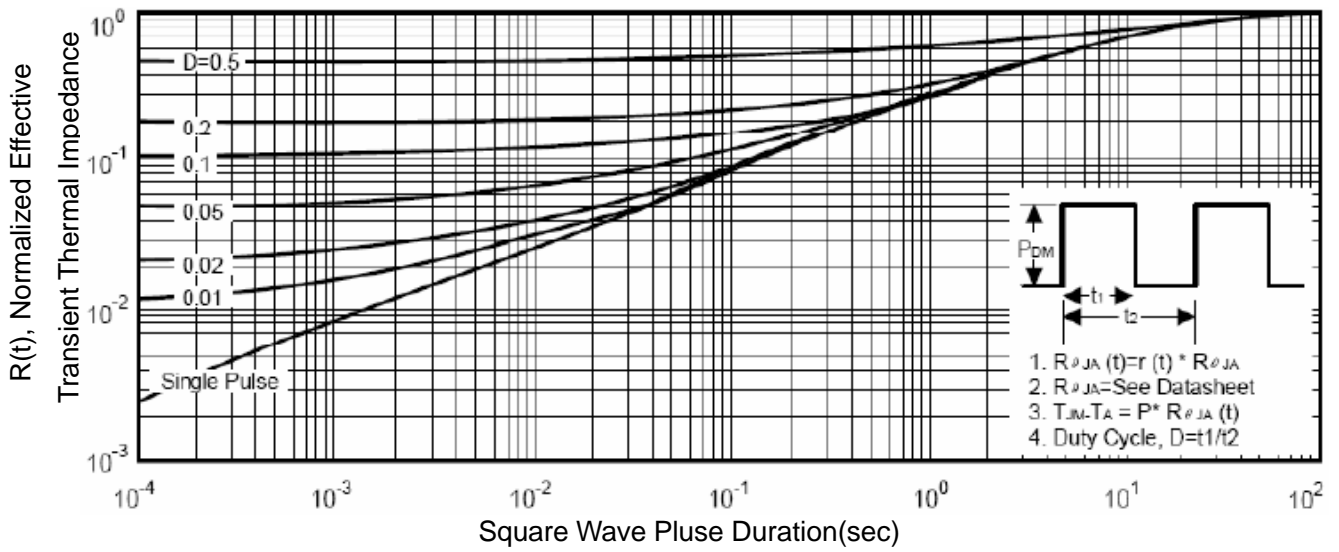
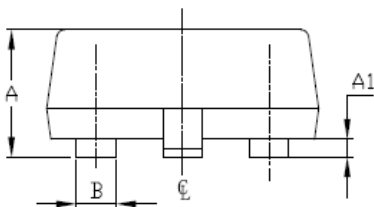
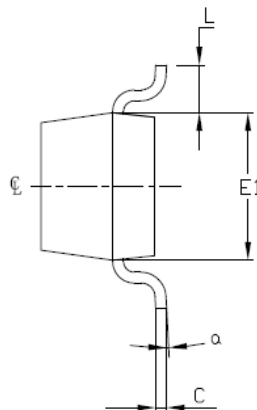
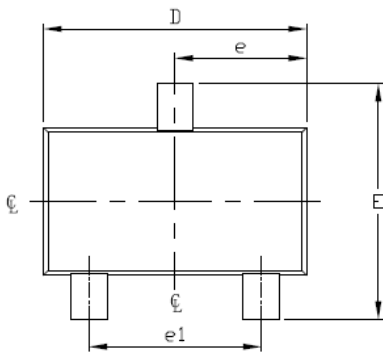


Figure11. Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	0.9	1.0	1.1
A1	0.00	0.06	0.1
B	0.3	0.4	0.5
C	0.07	0.09	0.18
D	2.8	2.9	3.04
E	2.1	2.33	2.64
E1	1.2	1.3	1.4
e	1.4	1.45	1.5
e1	1.80	1.90	2.00
L	0.45	0.54	0.63
a	0°	2.5°	7°