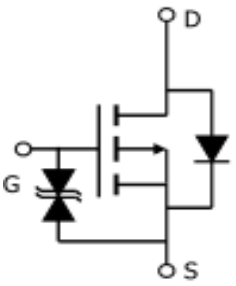
P-Channel Trench Power MOSFET

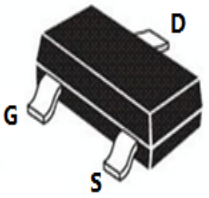
General Description

The PM3415 uses advanced trench technology to provide excellent RDS(ON) , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as
a load switch applications



Features

- V_{DS}=-20V； I_D=-4A；
  $R_{DS(ON)}$<50mΩ @ V_{GS}=-4.5V
  $R_{DS(ON)}$<70mΩ @ V_{GS}=-2.5V
- High Power and current handing capability
- Lead free product is acquired
- ESD Rating 2000V HBM



Application

- PWM applications
- Load switch
- Power management

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
3415	PM3415	SOT-23	3000units

Table 1. Absolute Maximum Ratings (TA=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V）	-20	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±10	V
$I_{D\ (DC)}$	Drain Current (DC) at Tc=25℃	-4	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed **(Note 1)**	-30	A
P_D	Maximum Power Dissipation(Tc=25℃)	1.5	W
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

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

Table 2. Thermal Characteristic

Symbol	Parameter	Value	Max	Unit
$R_{\theta JA}$	Thermal Resistance,Junction-to- Ambient	---	90	℃/W

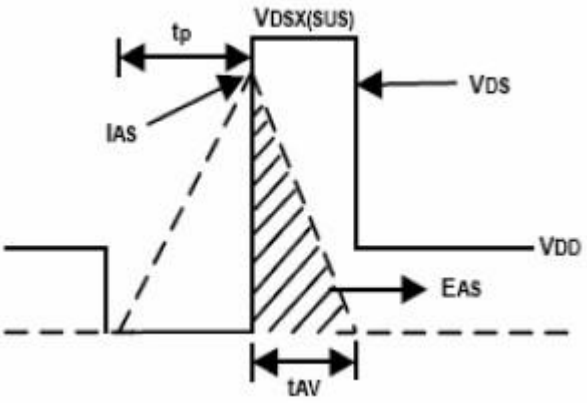
Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

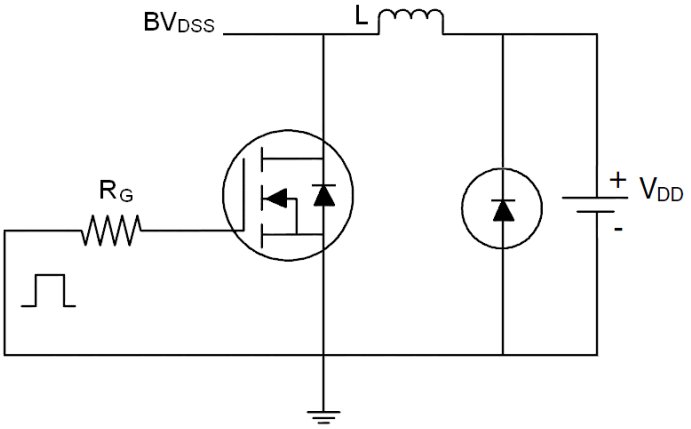
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-20			V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=-20V,V_{GS}=0V			-1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±10V,V_{DS}=0V			±10	μA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=-250μA	-0.5	-0.7	-0.9	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-4A		38	50	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-2.5V, I_D=-4A		50	70	mΩ
Dynamic Characteristics						
g_{FS}	Forward Transconductance	V_{DS}=-5V,I_D=-4A		20		S
C_{iss}	Input Capacitance	V_{DS}=-10V,V_{GS}=0V, f=1.0MHz		751		pF
C_{oss}	Output Capacitance			115		pF
C_{rss}	Reverse Transfer Capacitance			80		pF
Q_g	Total Gate Charge	V_{DS}=-10V,I_D=-4A, V_{GS}=-4.5V		9.3		nC
Q_{gs}	Gate-Source Charge			1		nC
Q_{gd}	Gate-Drain Charge			2.2		nC
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-4.5V, V_{DS}=-10V R_L=2.5Ω ,R_G=3Ω		13		nS
t_r	Turn-on Rise Time			9		nS
$t_{d(off)}$	Turn-Off Delay Time			19		nS
t_f	Turn-Off Fall Time			29		nS
Source-Drain Diode Characteristics						
I_{SD}	Source-Drain Current(Body Diode)				-4	A
V_{SD}	Forward On Voltage**(Note 1)**	T_J=25℃,I_{SD}=-4A,V_{GS}=0V	-0.5		-1.2	V

Notes 1.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting T_J=25℃

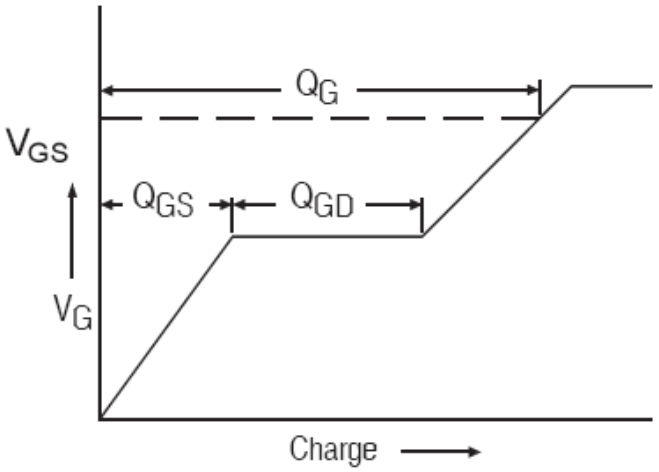
Test Circuit

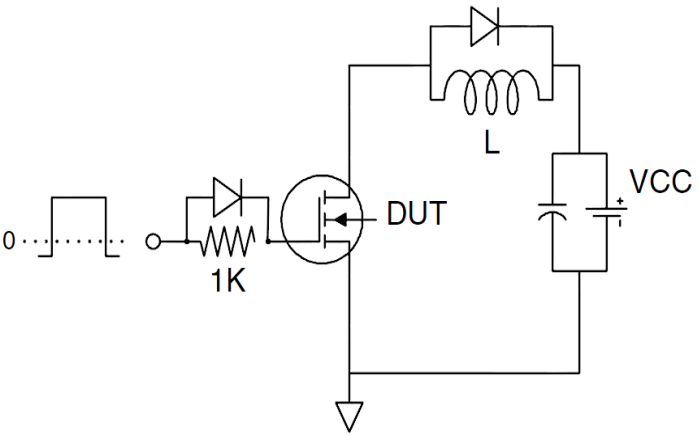
1）E_{AS} Test Circuits



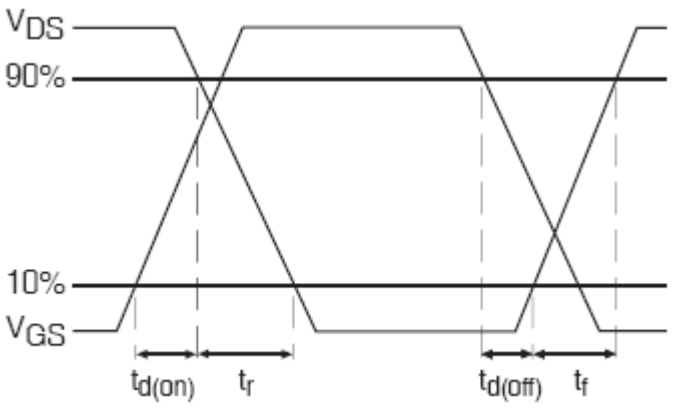


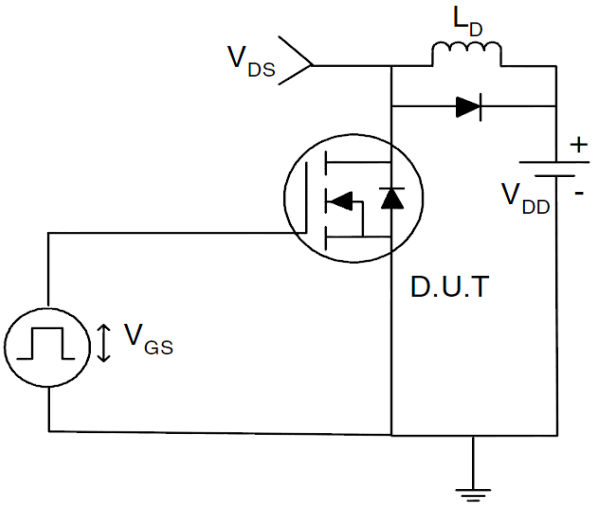
2）Gate Charge Test Circuit:





3）Switch Time Test Circuit:





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

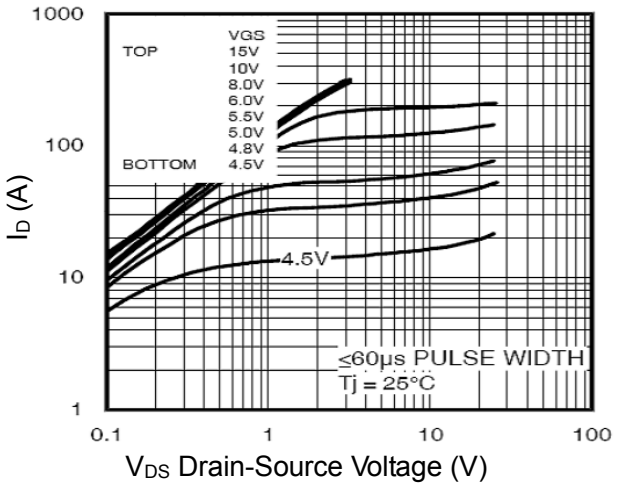


Figure2. Transfer Characteristics

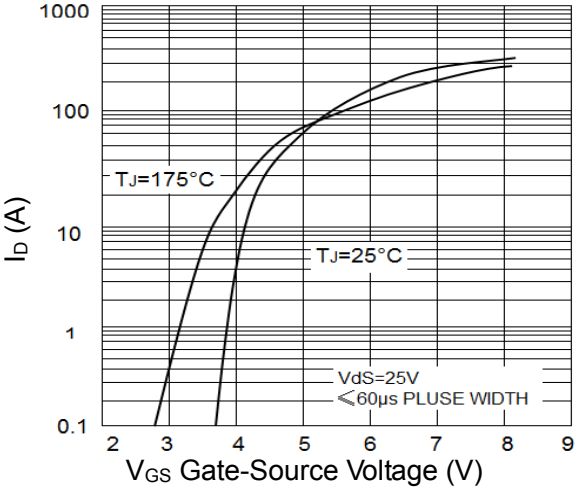


Figure3. BVDSS vs Junction Temperature

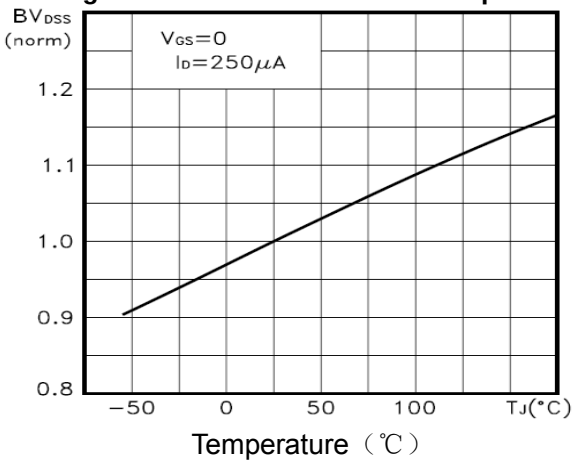


Figure4. Power Dissipation

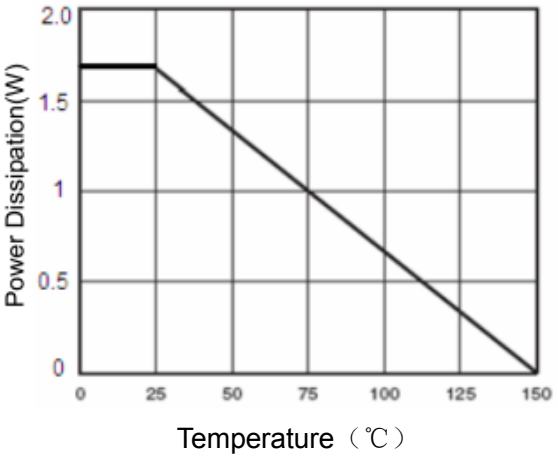


Figure7. BV_{DSS} vs Junction Temperature

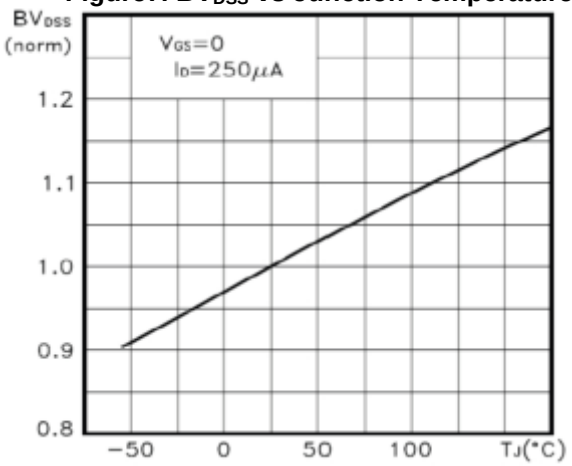


Figure8. $V_{GS(th)}$ vs Junction Temperature

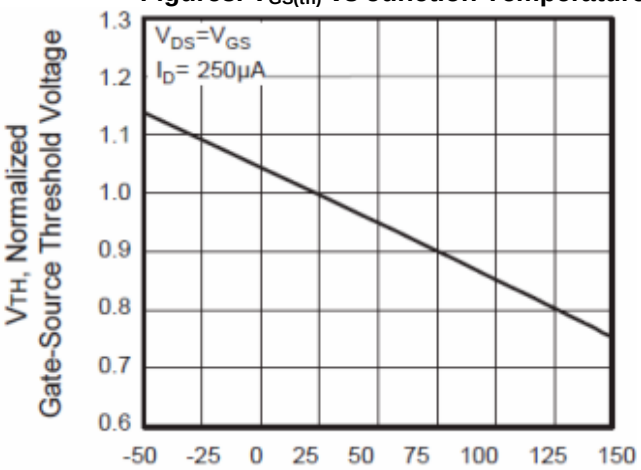


Figure7. Gate Charge

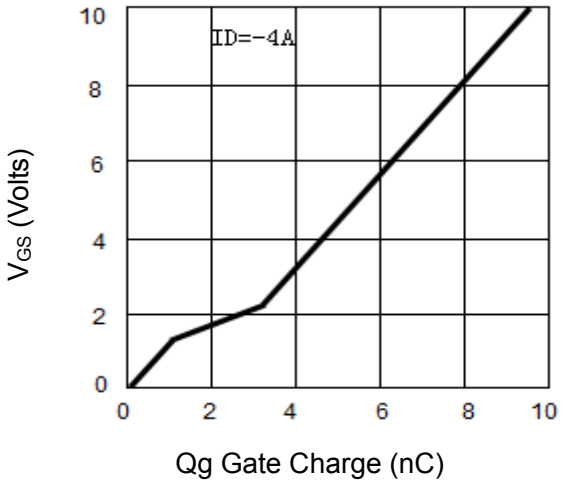


Figure8. Capacitance vs Vds

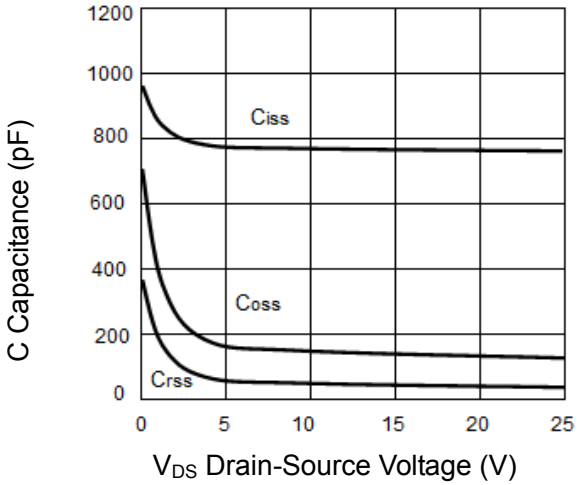


Figure9. Source- Drain Diode Forward

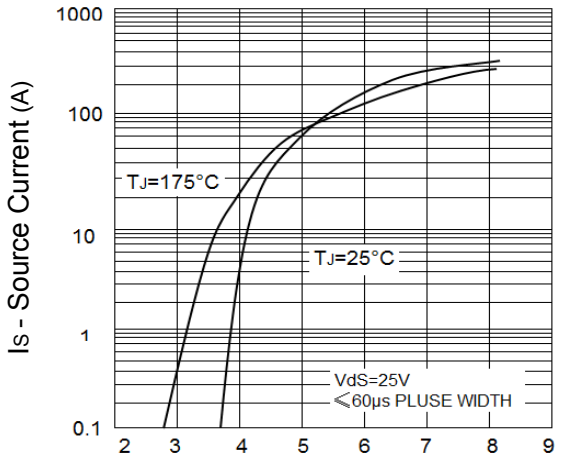


Figure10. Safe Operation Area

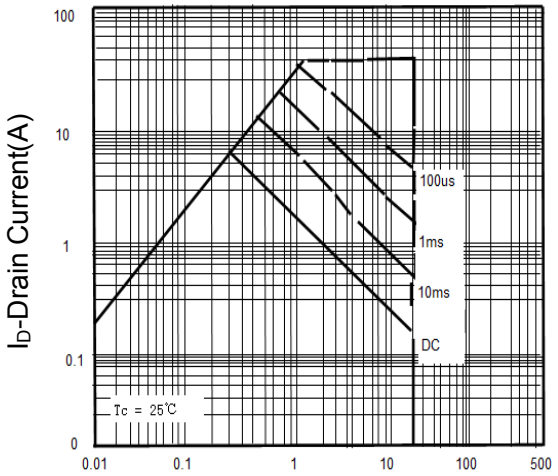
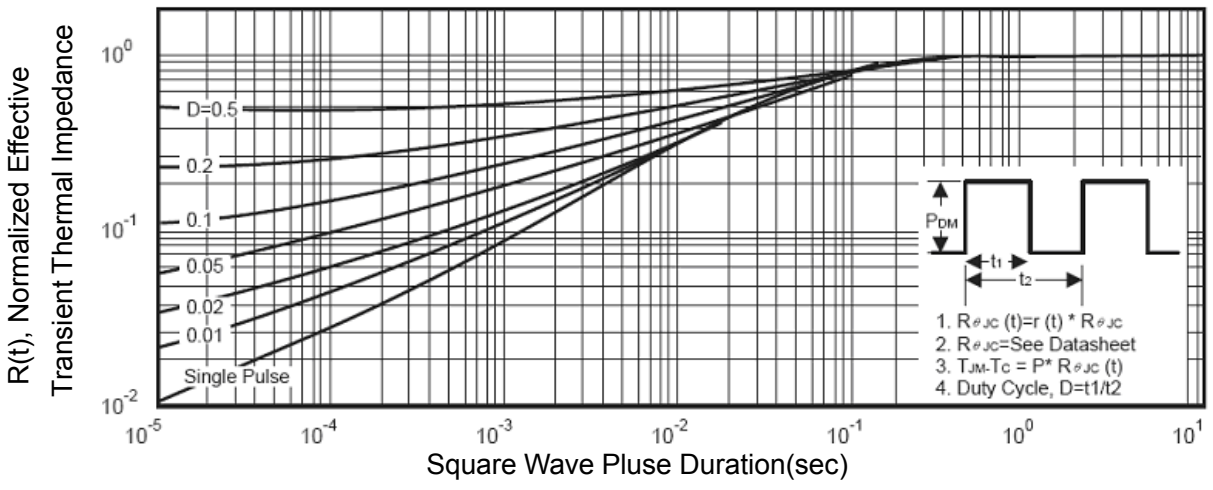
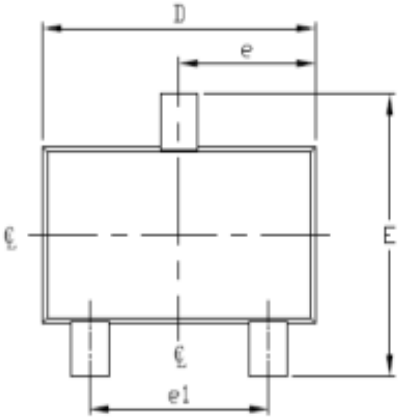
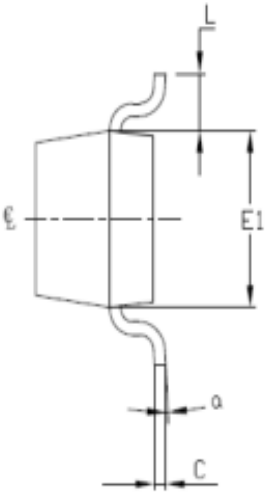


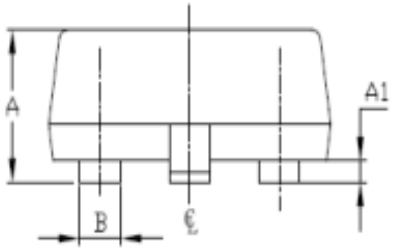
Figure11. Normalized Maximum Transient Thermal Impedance



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°