

WPM3407

Single P-Channel, -30 V, -4.4A, Power MOSFET

Description

The WPM3407 uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion applications. Standard Product WPM3407 is Pb-free.

Features

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ
-30 V	36 m Ω @ -10 V
	53 m Ω @ -4.5 V

Application

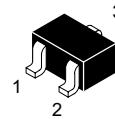
- Power Management in Note book
- Portable Equipment
- Battery Powered System
- DC/DC Converter
- Load Switch

ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$, unless otherwise noted					
Parameter	Symbol	10 S	Steady State	Unit	
Drain-Source Voltage	V_{DS}		-30	V	
Gate-Source Voltage	V_{GS}		± 20		
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	I_D	$T_A = 25^\circ\text{C}$	-4.4	-3.7	A
		$T_A = 70^\circ\text{C}$	-3.5	-2.9	
Pulsed Drain Current	I_{DM}		-20		
Maximum Power Dissipation ^a	P_D	$T_A = 25^\circ\text{C}$	1.4	1.0	W
		$T_A = 70^\circ\text{C}$	0.9	0.6	
Operating Junction and Storage Temperature Range	T_J, T_{stg}		-55 to 150	$^\circ\text{C}$	

Order information

Part Number	Package	Shipping
WPM3407-3/TR	SOT23-3	3000Tape&Reel

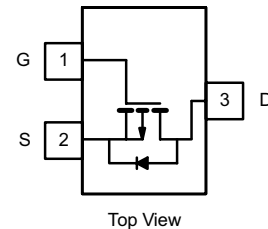
[Http://www.sh-willsemi.com](http://www.sh-willsemi.com)



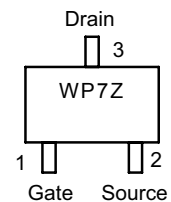
SOT 23-3

pin connections :

P-Channel



Marking:



W P7= Specific Device Code
Z = Date Code

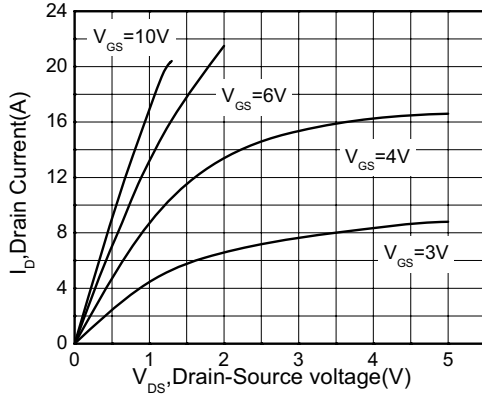
THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	t ≤ 10 s	R _{θJA}	70	90	°C/W
	Steady State		90	125	
Junction-to-Case Thermal Resistance	Steady State	R _{θJC}	50	80	

a. Surface Mounted on FR4 Board using 1 in sq pad size, 1oz Cu.

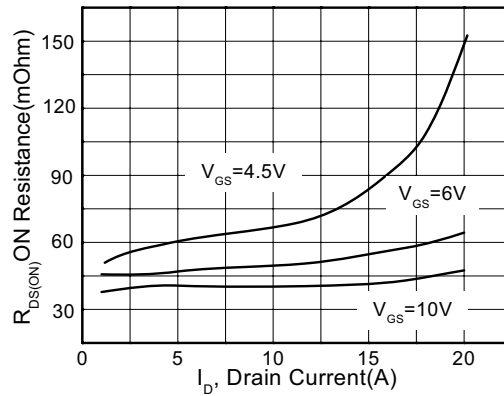
Electrical Characteristics (T_J = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = -250 μA	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 2.4 V, V _{GS} = 0 V	T _J = 25°C		-1	μA
			T _J = 85°C		-10	
Gate-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{GS} = V _{DS} , I _D = -250 μA	-1.0	-2.0	-3.0	V
Drain-source On-Resistance	R _{DS(on)}	V _{GS} = -10V, I _D = -4.4A		36	46	mΩ
		V _{GS} = -4.5, I _D = -3.0A		53	66	
Forward Recovery Voltage	V _{SD}	V _{GS} = 0 V, I _S = -1.0A	-0.5	-0.79	-1.5	V
Forward Transconductance	g _{FS}	V _{DS} = -5.0 V, I _D = -5 A	5	8		S
Dynamic						
Input Capacitance	C _{iss}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = -15 V	700	950	1200	pF
Output Capacitance	C _{oss}		90	120	150	
Reverse Transfer Capacitance	C _{rss}		75	100	125	
Total Gate Charge	Q _{g(tot)}	V _{GS} = -10 V, V _{DS} = -15 V, I _D = -5 A	13	18	23	nC
Threshold Gate Charge	Q _{g(th)}		1.5	2	2.5	
Gate- Source Charge	Q _{gs}		2	2.5	3	
Gate- Drain Charge	Q _{gd}		3	3.8	4.5	
Gate Resistance	R _g	V _{GS} = 0 V, V _{DS} = 0 V, f = 1.0 MHz		5	8	Ω
Switching Parameters						
Turn-On Delay Time	t _{d(on)}	V _{GS} = -10 V, V _{DS} = -15 V, I _D = -4.3A, R _G = 6 Ω	8	11	15	ns
Rise Time	t _r		4	6	9	
Turn-Off Delay Time	t _{d(off)}		30	40	50	
Fall Time	t _f		5	7.5	10	
Body Diode Reverse Recovery Time	t _{rr}	I _F = -5A, dI/dt = 100A/μs		25		ns
Body Diode Reverse Recovery Charge	Q _{rr}	I _F = -5A, dI/dt = 100A/μs		14		nC

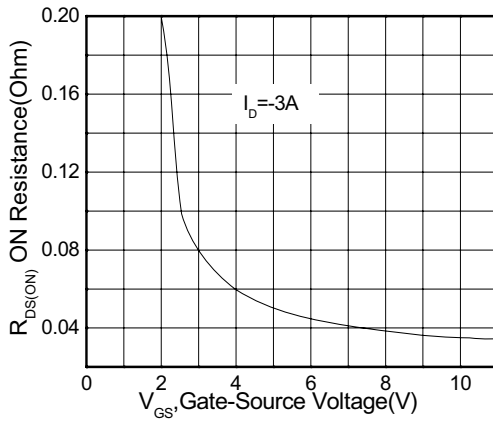
Typical Performance Characteristics



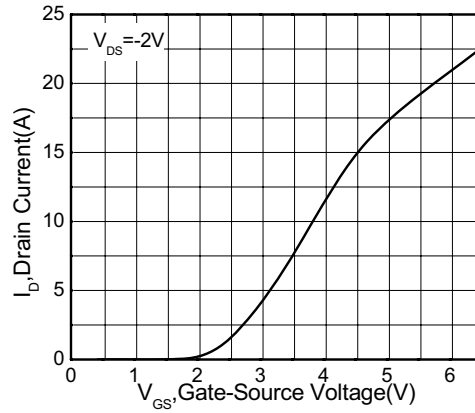
Drain Current VS Drain-Source voltage



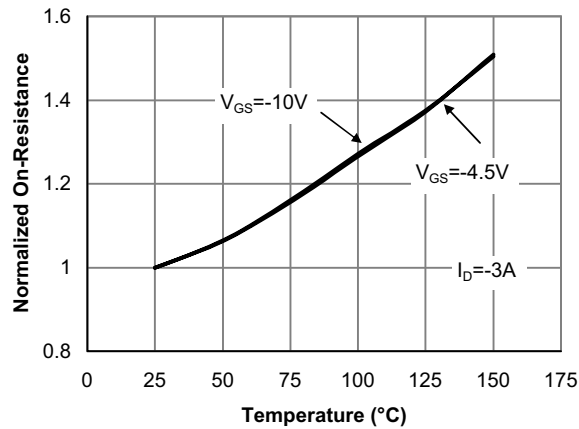
Drain Current vs ON Resistance



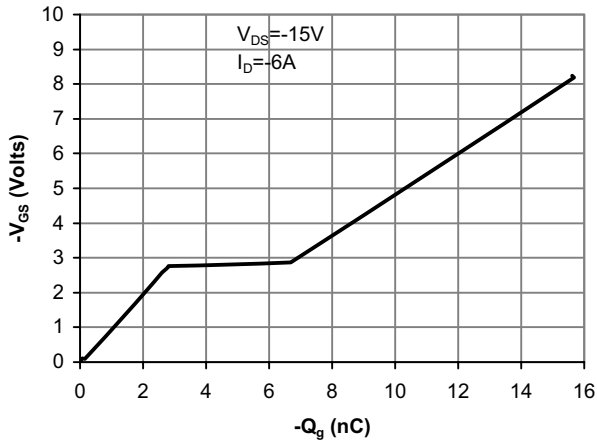
Gate-Source Voltage vs ON Resistance



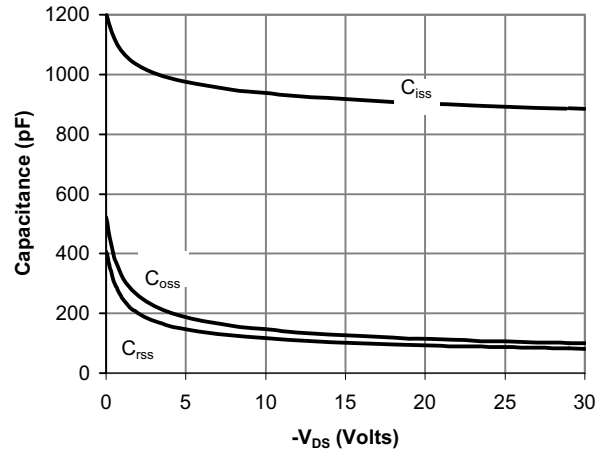
Drain Current VS Gate-Source Voltage



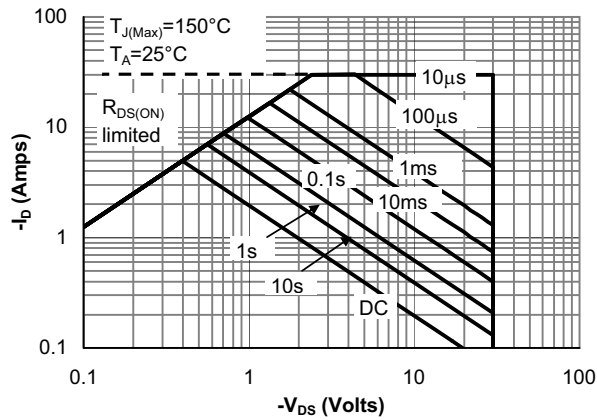
On-Resistance vs. Junction



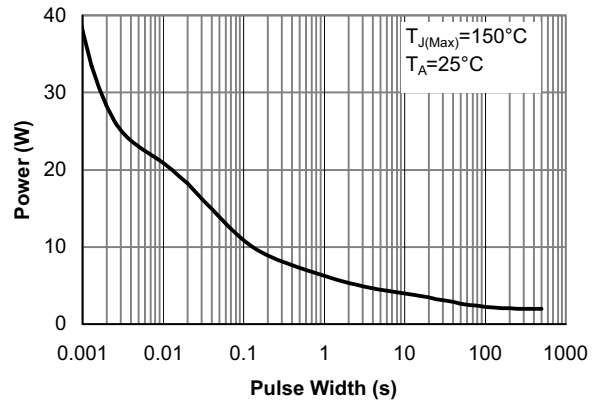
Gate-Charge Characteristics



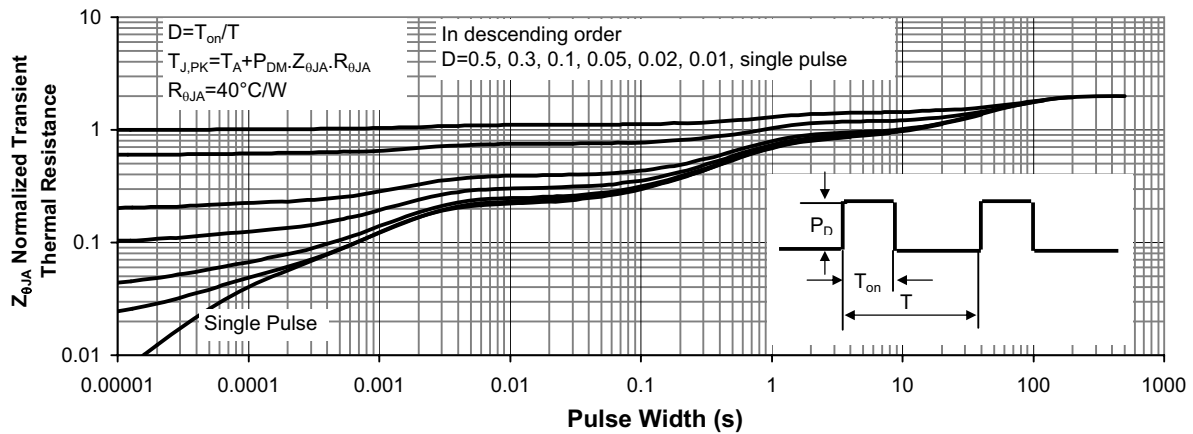
Capacitance Characteristics



Maximum Forward Biased Safe Operating Area (Note E)

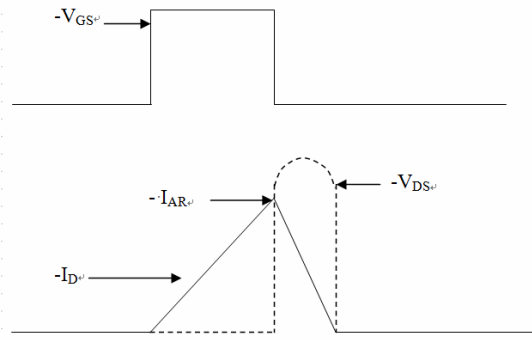
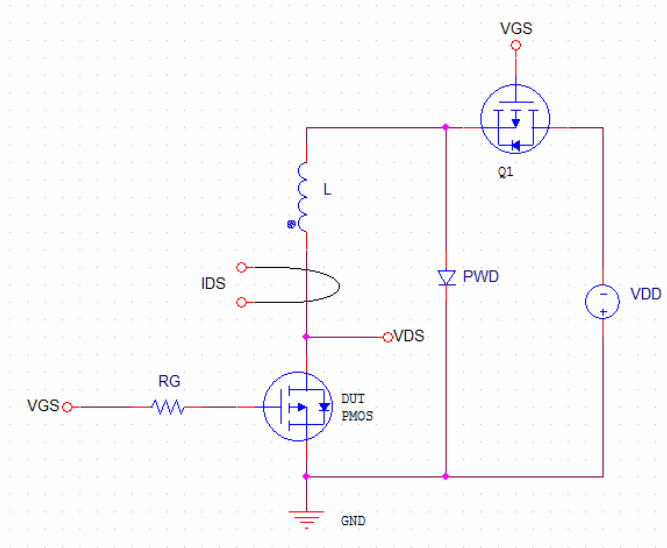


Single Pulse Power Rating Junction-to-Ambient (Note E)



Normalized Maximum Transient Thermal Impedance

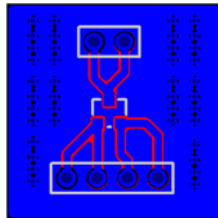
Avalanche Energy(Single pulsed) Test Circuit & Waveforms



$$E_{AS} = \frac{1}{2} L \cdot I_{AR}^2$$

Power Dissipation Characteristics

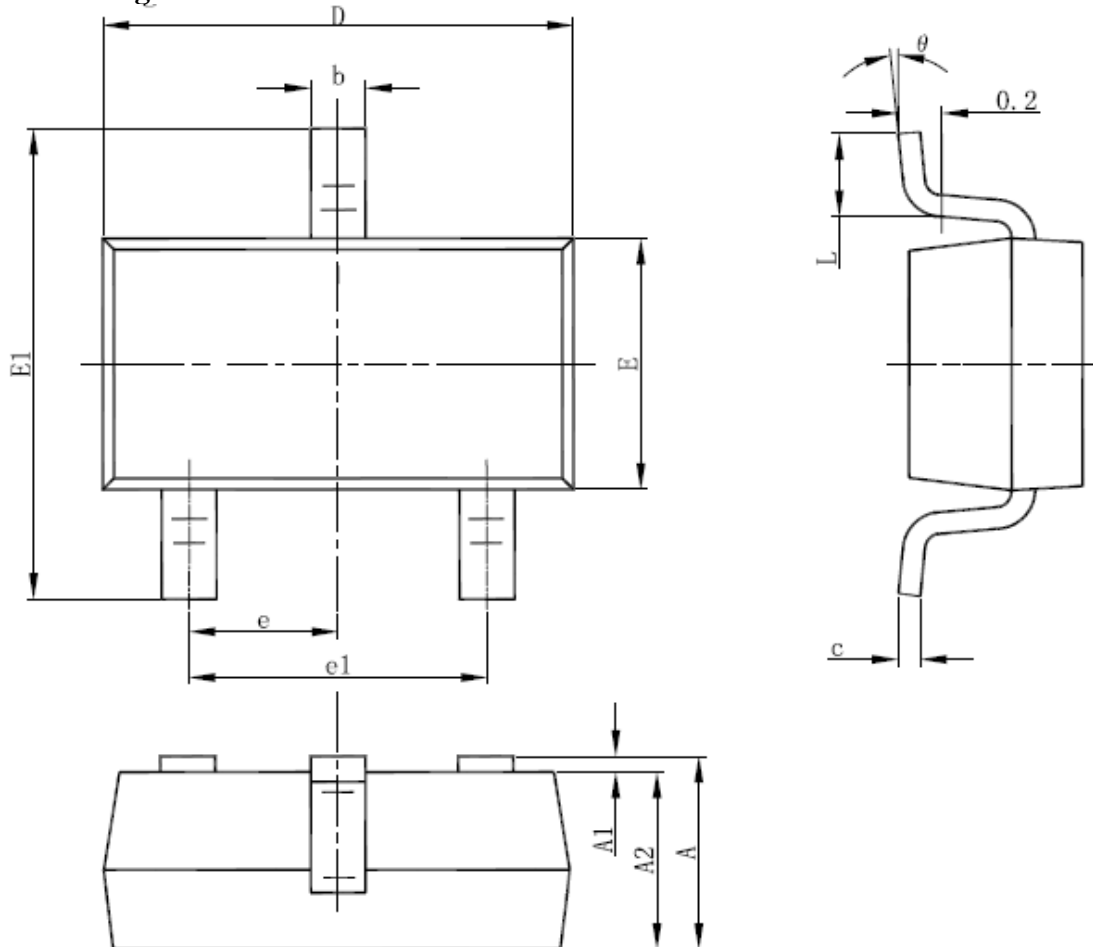
1. The package of WPM3407 is SOT23-3, surface mounted on FR4 Board using 1 in sq pad size, 1 oz Cu, $R_{\theta JA}$ is 125 °C/W.
2. The power dissipation P_D is based on $T_{J(MAX)}=150^{\circ}C$, and the relation between T_J and P_D is $T_J = T_a + R_{\theta JA} * P_D$, the maximum power dissipation is determined by $R_{\theta JA}$.
3. The $R_{\theta JA}$ is the thermal impedance from junction to ambient, using larger PCB pad size can get smaller $R_{\theta JA}$ and result in larger maximum power dissipation.



125 °C/W when mounted on
a 1 in² pad of 1 oz copper.

Packaging Information

SOT-23-3 Package Outline Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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[IPS60R600PFD7SAKMA1](#) [IPS60R210PFD7SAKMA1](#) [DMN2990UFB-7B](#)