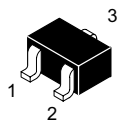
WPM3407

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.

http://www.willsemi.com



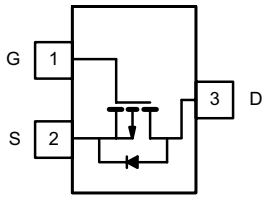
SOT 23-3

Features

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
−30 V	36 mΩ @ −10 V	−4.4A
	53 mΩ @ −4.5 V	

pin connections:

P−Channel

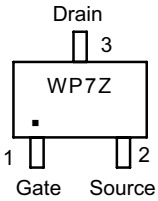


Top View

Application

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

Marking:



W P7= Specific Device Code
Z = Date Code

ABSOLUTE MAXIMUM RATINGS T_A = 25 °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 °C)[a]	T_A=25°C	I_D	4.4	3.7	A
	T_A=70°C		3.5	2.9	
Pulsed Drain Current		I_{DM}	-20		
Maximum Power Dissipation [a]	T_A=25°C	P_D	1.4	1.0	W
	T_A=70°C		0.9	0.6	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 to 150		°C

Order information

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

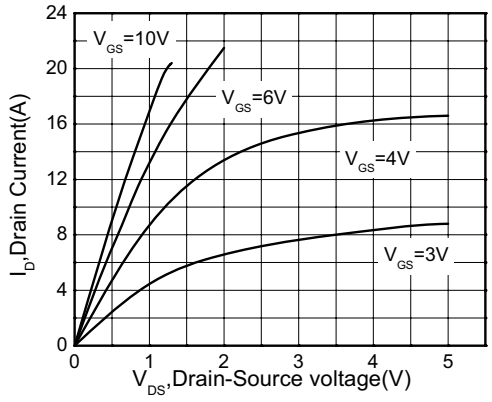
THERMAL RESISTANCE RATINGS					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance [a]	t ≤ 10 s	$R_{\theta JA}$	70	90	°C/W
	Steady State		90	125	
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	50	80	

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

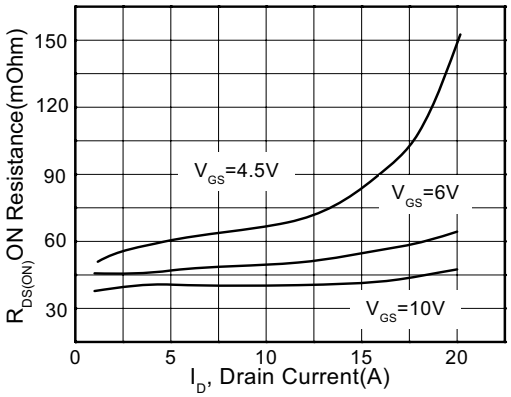
Electrical Characteristics (T_J = 25°C unless otherwise noted)

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} = -30 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		29	36	43	mΩ
		V_{GS} = -4.5, I_D = -3A		42	53	63	
Forward Recovery Voltage	V_{SD}	V_{GS} = 0 V, I_S = -1.0 A		-0.5	-0.79	-1	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

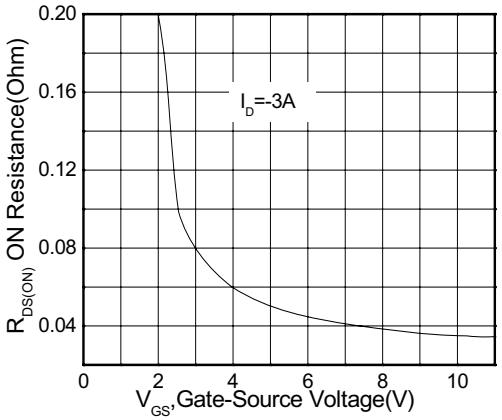
Typical Performance Characteristis



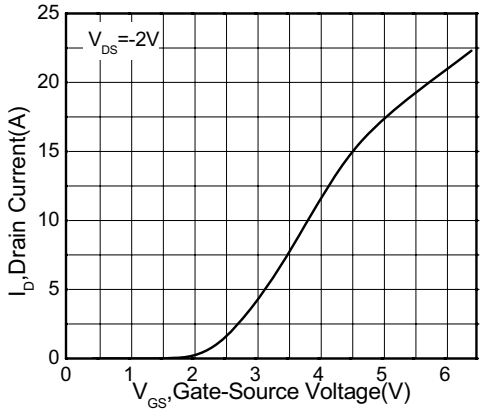
Drain Current VS Drain-Source voltage



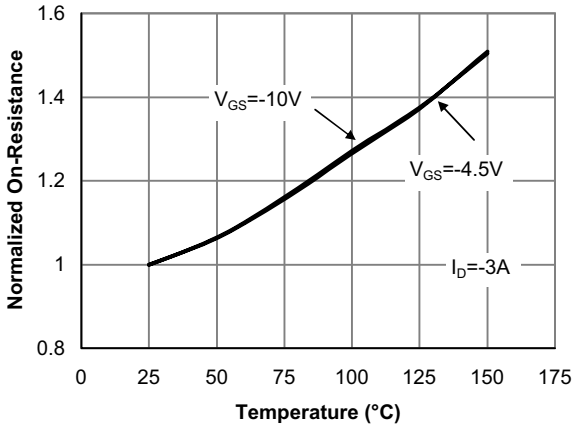
Drain Current vs ON Resistance



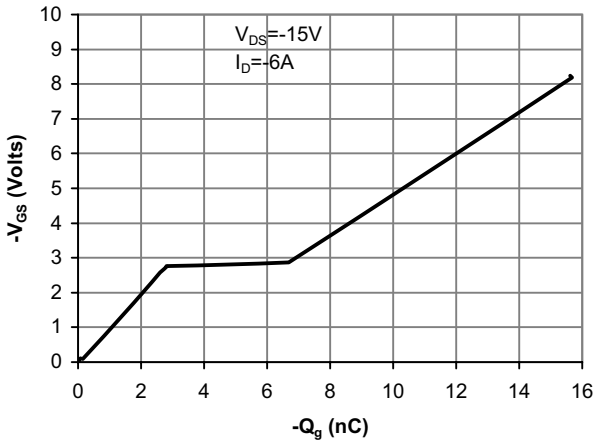
Gate-Source Voltage vs ON Resistance



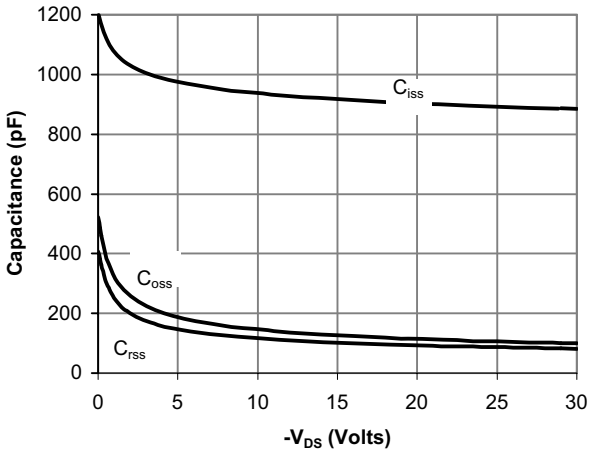
Drain Current VS Gate-Source Voltage



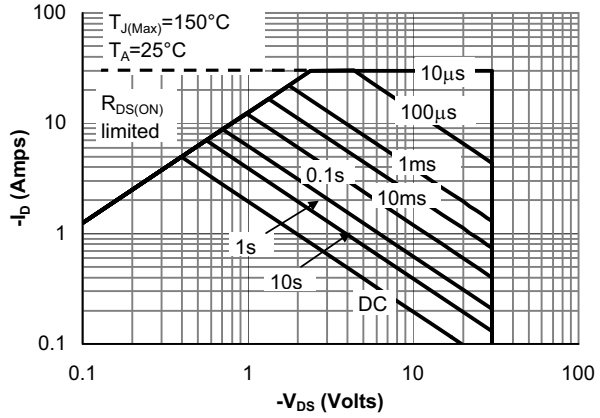
On-Resistance vs. Junction



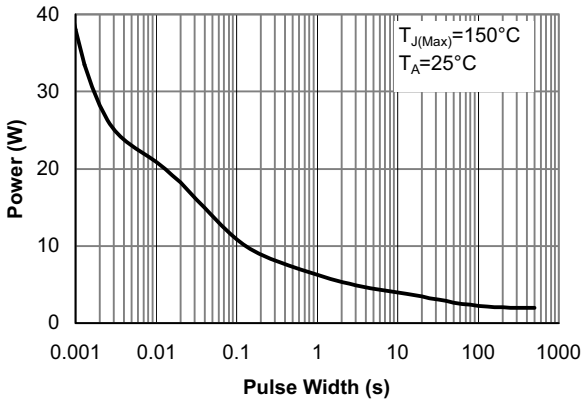
Gate-Charge Characteristics



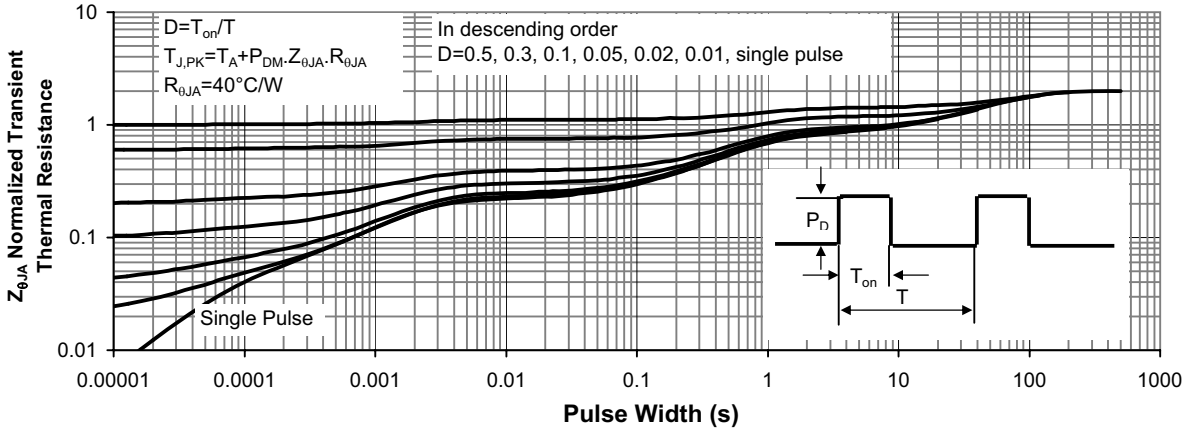
Capacitance Characteristics



Maximum Forward Biased Safe Operating Area (Note E)



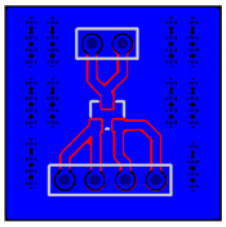
Single Pulse Power Rating Junction-to-Ambient (Note E)



Normalized Maximum Transient Thermal Impedance

Power Dissipation Characteristics

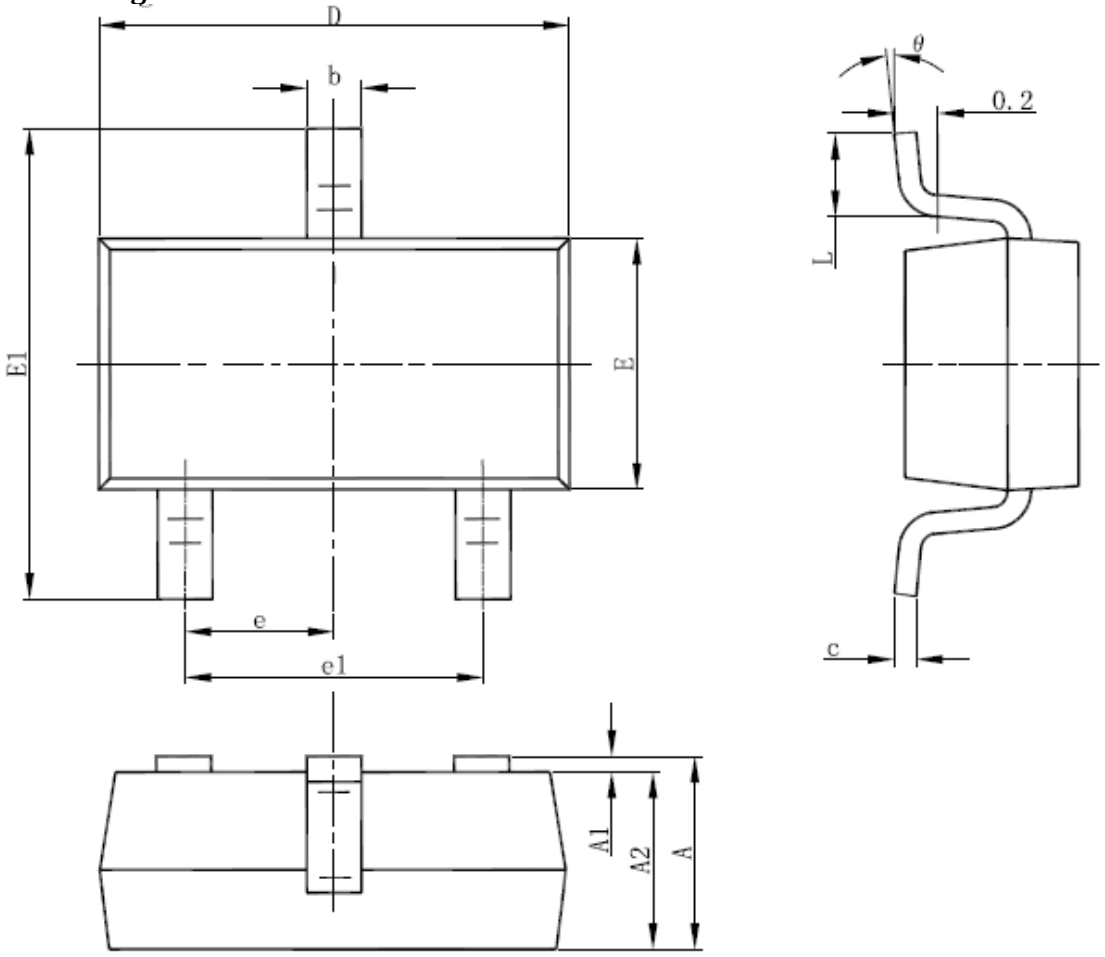
1. The package of WPM3407 is SOT23-3, surface mounted on FR4 Board using 1 in sq pad size，1 oz Cu， $R_{\theta JA}$ is 125 ℃/W.
2. The power dissipation P_D is based on $T_{J(MAX)}$=150°C, and the relation between T_J and P_D is $T_J = T_a + R_{\theta JA} * P_D$, the maximum power dissipation is determined 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 ℃/W when mounted on
a 1 in^2 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°