WPM2009D

-20V, -4A, 42mΩ, 2.0W, DFN3x3, P-MOSFET **Http://www.willsemi.com**

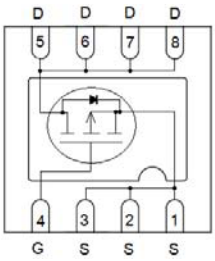
Descriptions

This single P-Channel MOSFET is produced using trench process that provides minimum on resistance performance. WPM2009D is enhancement power MOSFET with 2.0W power dissipation mounting 1 in^2 pad in a DFN3x3 package. This device is suited for high power charging circuit of mobile phone application. It also can be used in a high power switching application.

Bottom

DFN3x3-8L

Bottom

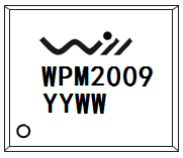


Pin Connection

Features

- Max Rds(on) 42mΩ @ Vgs=-4.5V
- Max Vds -20V
- Max Current -4.0A
- Typical Vgs(th) -0.65V @ Id=-250uA
- Power Dissipation 2.0W (Note2)
- High performance Trench process
- DFN3x3-8L Package
- Pb-Free

Top



WPM2009 = Part Number
YY = Year
WW = Week

Marking

Applications

- Battery charging
- Load Switch
- Power Switch
- DC-DC converter

Order Information

Device	Package	Shipping
WPM2009D-8/TR	DFN3x3-8L	3000/Tape&Reel

Maximum Ratings

(T_A=25°C unless otherwise noted)

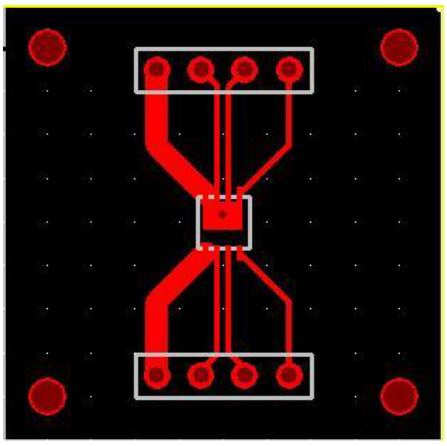
Symbol	Parameter	Ratings	Unit
V_{DS}	Drain-to-Source Voltage	-20	V
V_{GS}	Gate-to-Source Voltage	±12	V
I_D	Drain Current – Continue **Note1**	-4.0	A
	Drain Current – Continue (t<5s) **Note1**	-4.9	A
	Drain Current – Continue **Note2**	-6.5	A
	Drain Current – Pulsed (t<300us, Duty<2%) **Note2**	-24	A
P_D	Power Dissipation – **Note1**	1.0	W
	Power Dissipation – (t<5s) **Note1**	1.5	W
	Power Dissipation – **Note2**	2.0	W
T_J	Operation junction temperature range	150	°C
T_{SG}	Storage temperature range	-55~150	°C

Thermal Resistance Ratings

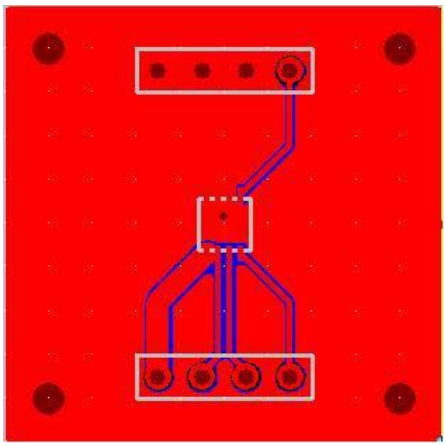
Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient – **Note1**	125	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient – **Note2**	62	°C/W

Note1: Surface mounted on a 2 oz copper, recommend minimum pad, FR-4 board.

Note2: Surface mounted on a 2 oz copper, 1 in^2 pad with dual side, FR-4 board.



Note1



Note2

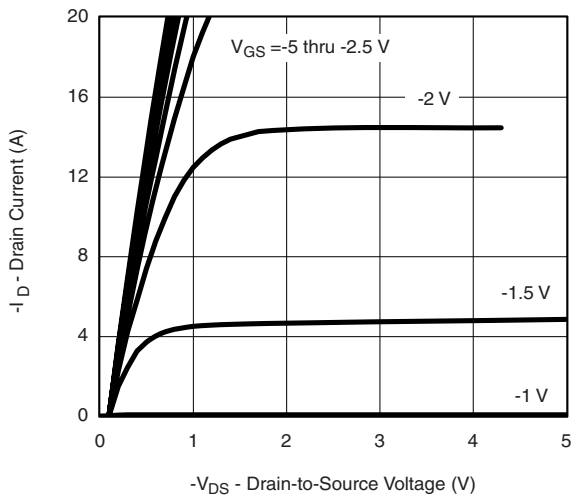
Electronics Characteristics

(T_A = 25°C, unless otherwise noted)

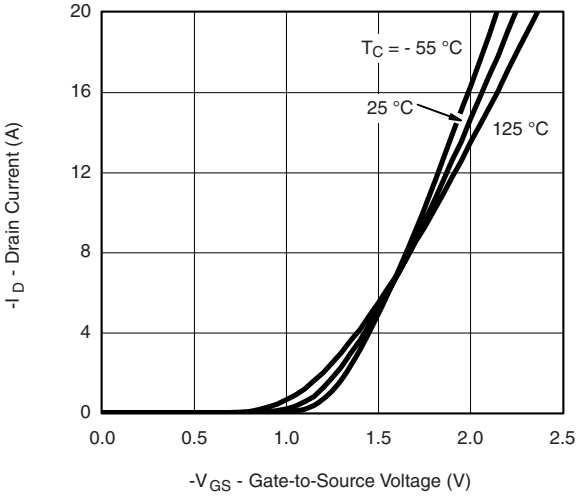
Symbol	Parameter	Test Condition	Min	Typ.	Max	Unit
Off Characteristics						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250A	-20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-16V, V_{GS}=0V			-1.0	uA
I_{GSS}	Gate –Source leakage current	V_{GS}=±12V, V_{DS}=0V			±100	nA
ON Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS}, I_D=-250A	-0.35	-0.65	-1.00	V
$R_{DS(on)}$	Drain-Source On-Resistance	V_{GS}=-4.5V, I_D=-4.0A		42	59	mΩ
		V_{GS}=-2.5V, I_D=-3.5A		54	74	mΩ
		V_{GS}=-1.8V, I_D=-3.0A		77	93	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-3.3A		3.0		S
Dynamic Characteristics						
Ciss	Input Capacitance	V_{DS}=-6V, V_{GS}=0V, F=1.0 MHz	700	850	1000	pF
Coss	Output Capacitance		100	150	200	pF
Crss	Reverse Transfer Capacitance		80	120	150	pF
$Q_{G(TOT)}$	Total Gate Charge	V_{DS}=-6V,I_D=-3.3A, V_{GS}=-4.5V	8	12	15	nC
$Q_{G(TH)}$	Threshold gate charge		0.4	0.6	0.8	nC
Q_{GS}	Gate-Source Charge		1.2	1.6	2.0	nC
Q_{GD}	Gate-Drain Charge		1.8	2.2	2.6	nC
Switching Characteristics						
td(on)	Turn-On Delay Time	V_{GS}=-4.5V, V_{DS}=-6V, I_D= -1.0A, R_G=6.0Ω	15	19	25	ns
tr	Turn-On Rise Time		5	8	15	ns
td(off)	Turn-Off Delay Time		80	100	120	ns
tf	Turn-Off Fall Time		15	25	35	ns
Drain-to-Source Diode Characteristics						
V_{SD}	Forward Diode Voltage	V_{GS}=0V, I_S=-1.6A		-0.7		V

Typical Performance Graph

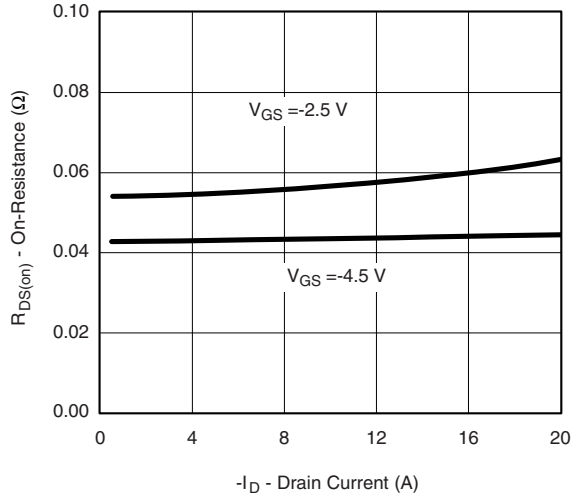
(T_A = 25°C, unless otherwise noted)



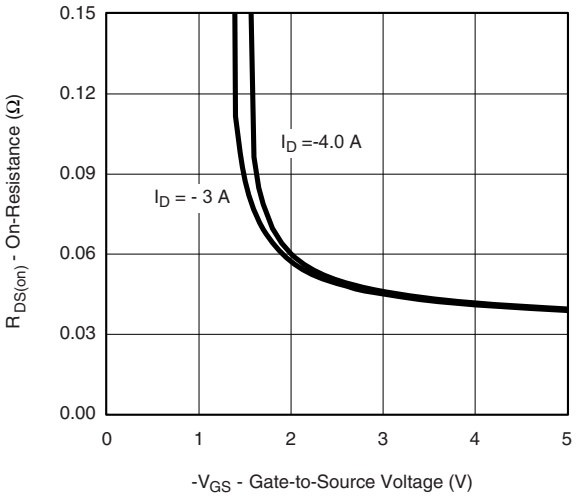
Output Characteristics



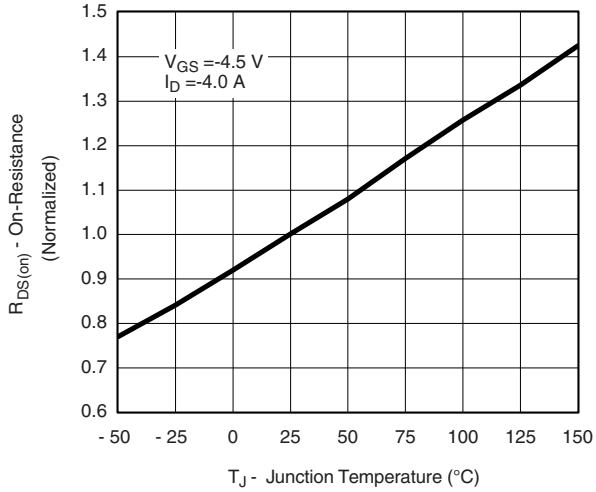
Transfer Characteristics



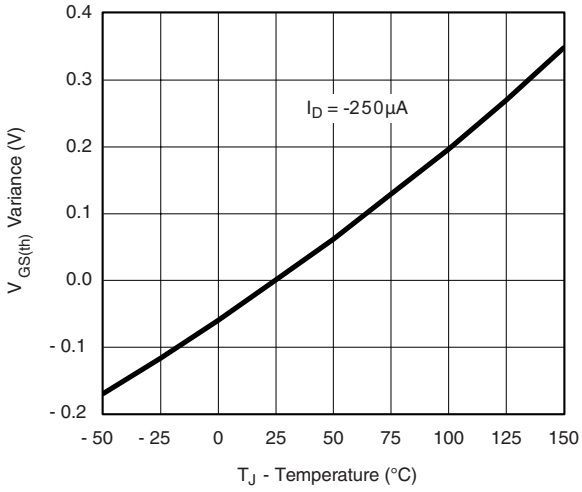
On-Resistance vs. Drain Current



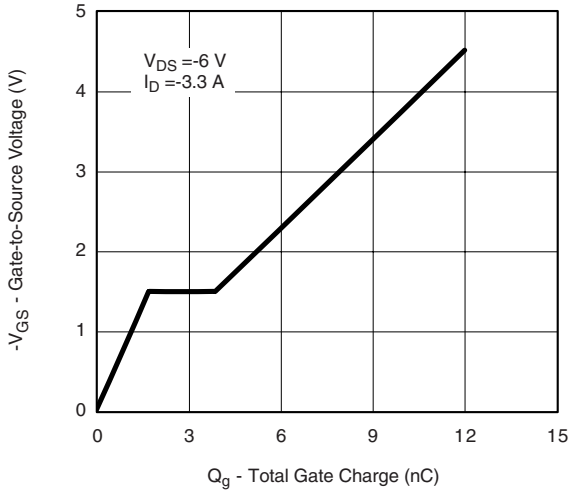
On-Resistance vs. Gate-to-Source Voltage



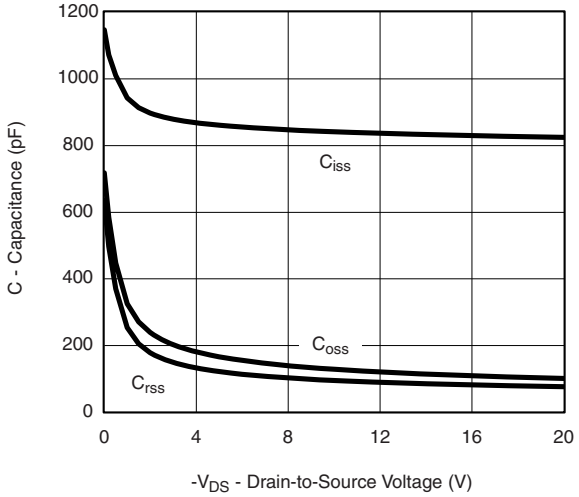
On-Resistance vs. Junction Temperature



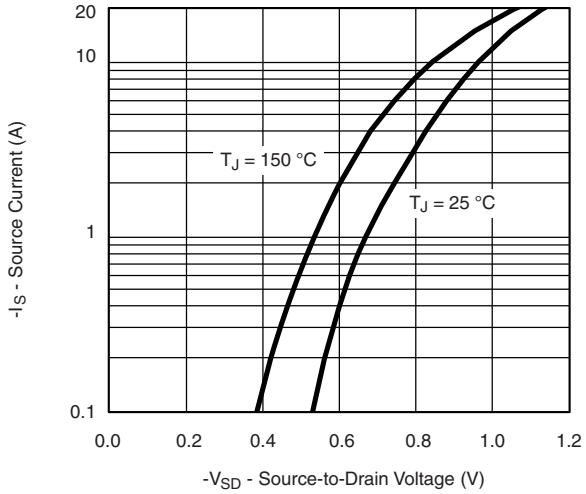
Threshold Voltage



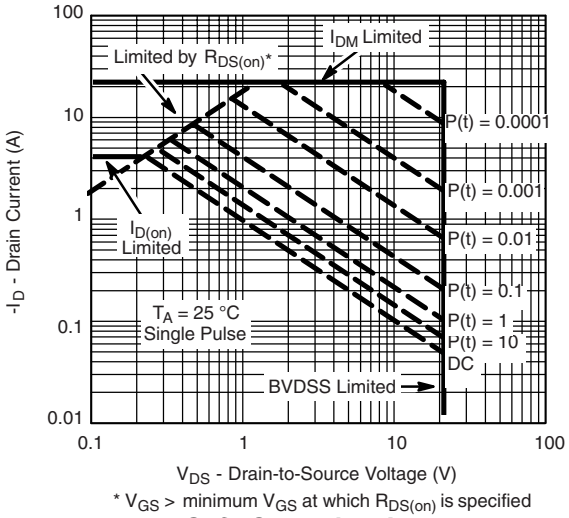
Gate Charge



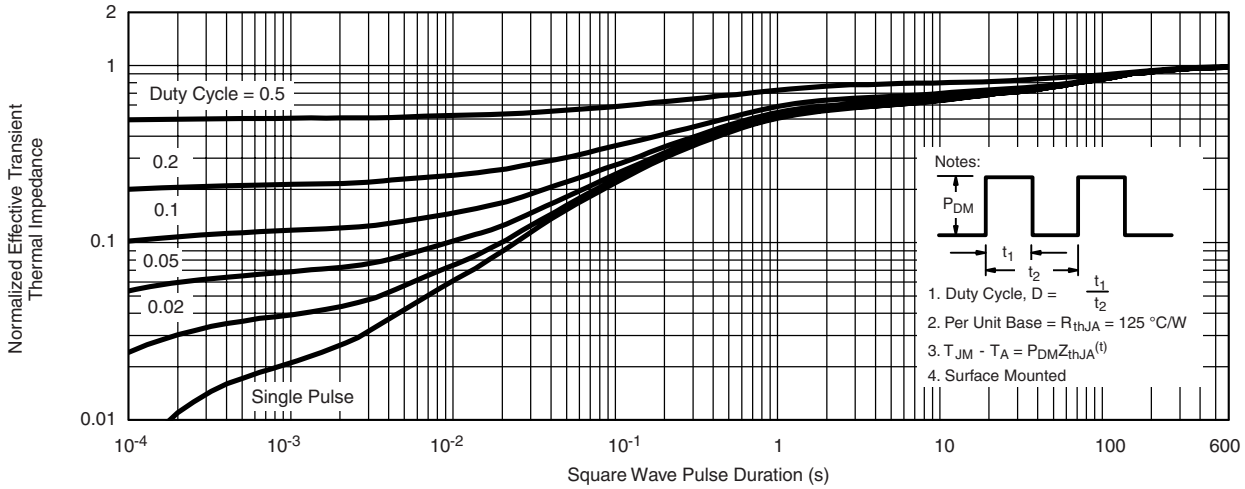
Capacitance



Source-Drain Diode Forward Voltage



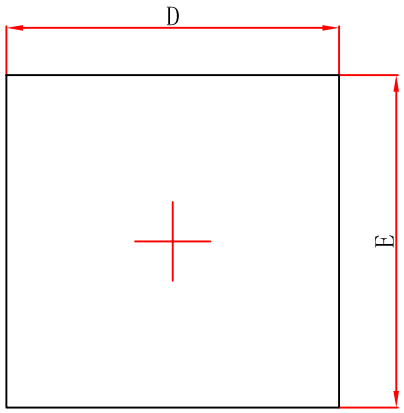
Safe Operating Area



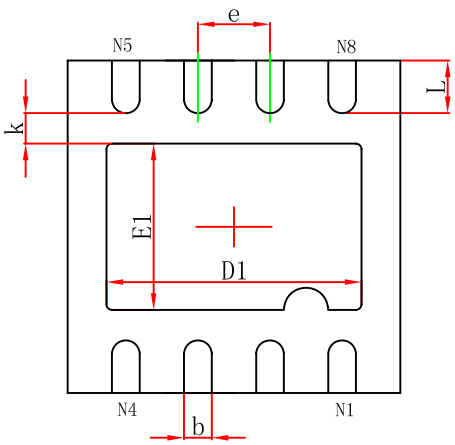
Normalized Thermal Transient Impedance, Junction-to-Ambient

Package Outline Dimension

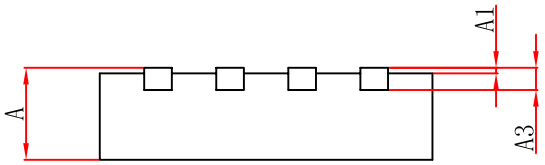
DFN3x3-8L



Top View



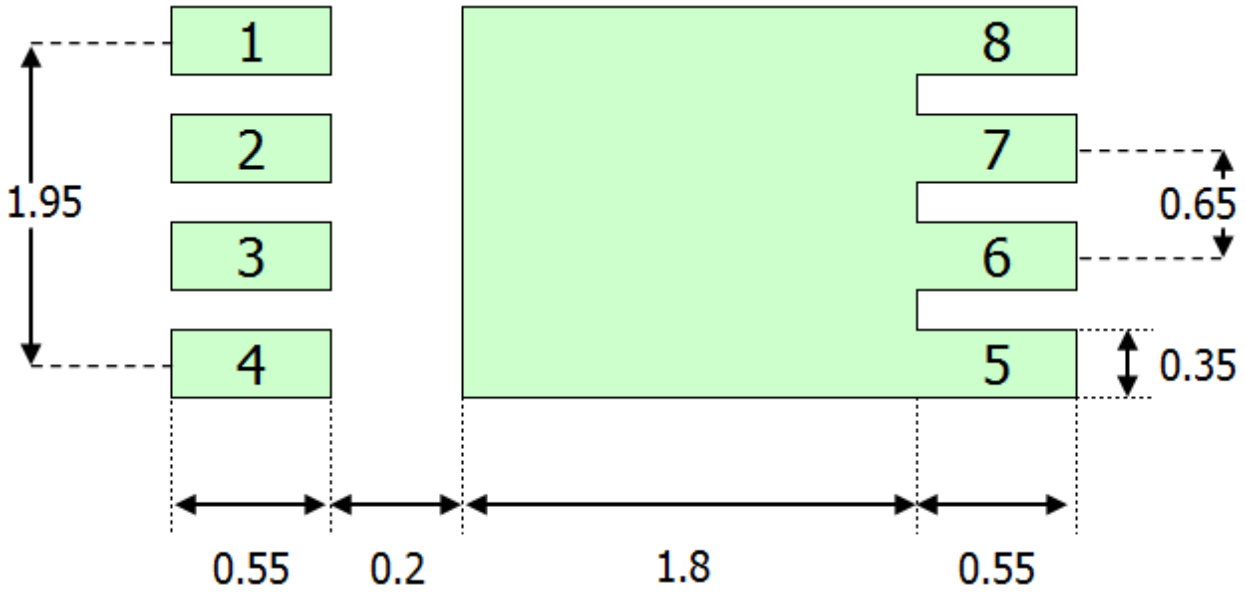
Bottom View



Side View

Symbol	Dimensions in millimeters	
	Min.	Max.
A	0.7	0.8
A1	0.00	0.05
A3	0.203 Ref.	
D	2.9	3.1
E	2.9	3.1
D1	2.2	2.4
E1	1.4	1.6
k	0.200 Min.	
b	0.18	0.3
e	0.650 Typ.	
L	0.375	0.575

PCB Layout Guide



Recommend Minimum Pad Guide

Unit: mm