

WPM2005

Power MOSFET and Schottky Diode

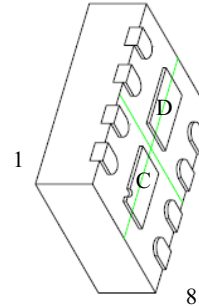
Features

- Featuring a MOSFET and Schottky Diode
- Independent Pinout to each Device to Ease Circuit Design
- Ultra Low V_F Schottky

Applications

- Li-Ion Battery Charging
- High Side DC-DC Conversion Circuits
- High Side Drive for Small Brushless DC Motors
- Power Management in Portable, Battery Powered Products

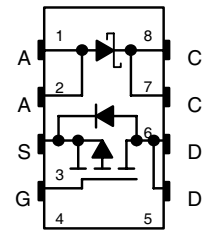
DFN3×2-8L



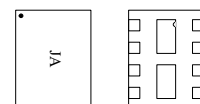
MOSFET MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Units	
Drain-to-Source Voltage		V_{DS}	-20	V	
Gate-to-Source Voltage		V_{GS}	± 8.0	V	
Continuous Drain Current (Note 1)	Steady State	$T_J = 25^\circ\text{C}$	-2.9	A	
		$T_J = 85^\circ\text{C}$	-1.8		
	$t \leq 5 \text{ s}$	$T_J = 25^\circ\text{C}$	-3.7		
Power Dissipation (Note 1)	Steady State	$T_J = 25^\circ\text{C}$	P_D	1.4	W
			$t \leq 5 \text{ s}$	2.2	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	-13	A	
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to 150	$^\circ\text{C}$	
Source Current (Body Diode)		I_S	1.7	A	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$	

pin connections:



Marking:



J = Specific Device Code
A = Date Code

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

SCHOTTKY DIODE MAXIMUM RATINGS($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limits	Unit
Peak repetitive reverse voltage	V_{RRM}	20	V
DC Blocking voltage	V_R	20	V
Average rectified forward current	I_F	1	A

Order information

Part Number	Package	Shipping
WPM2005-8/TR	DFN3*2- 8L	3000 Tape & Reel

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	89	$^{\circ}C/W$
Junction-to-Ambient – $t \leq 5$ s (Note 2)	$R_{\theta JA}$	57	$^{\circ}C/W$

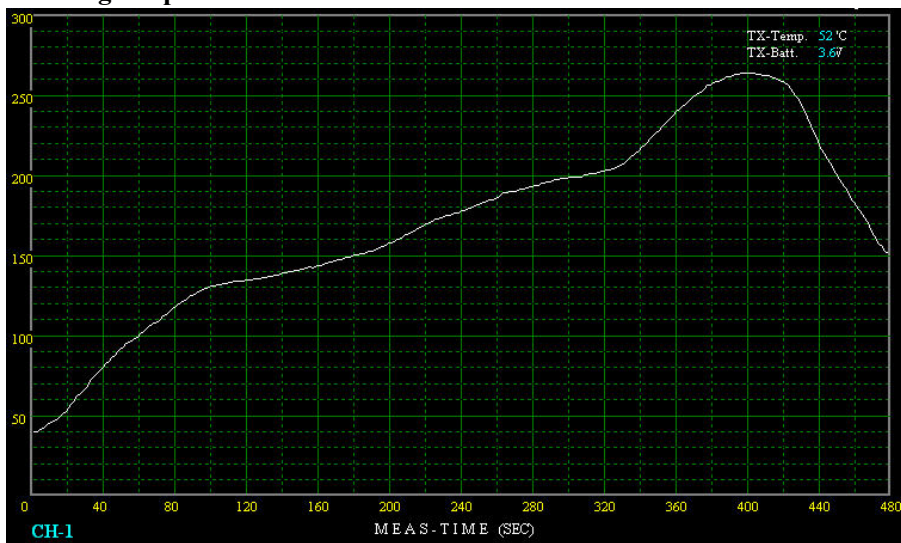
2. Surface Mounted on FR4 Board using 1 in sq pad size, 1oz Cu.

MOSFET ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -16V, V_{GS} = 0V$			-1	μA
Gate-Source leakage current	I_{GSS}	$V_{GS} = \pm 8V, V_{DS} = 0V$			± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = -250\mu A$	-0.45			V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = -4.5V, I_D = -2.7A$			110	m Ω
		$V_{GS} = -2.5V, I_D = -2.2A$			160	m Ω
Forward Transconductance	g_{FS}	$V_{DS} = -10V, I_D = -2.7A$		7.0		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = -10V, V_{GS} = 0V,$ $f = 1.0$ MHz			700	pF
Output Capacitance	C_{oss}				150	pF
Reverse Transfer Capacitance	C_{rss}				90	pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = -4.5V, V_{DD} = -10V,$ $I_D = -1.0A, R_G = 6.0\Omega,$			10	ns
Turn-On Rise Time	t_r				20	ns
Turn-Off Delay Time	$t_{d(off)}$				60	ns
Turn-Off Fall Time	t_f				30	ns
Total Gate Charge	$Q_{G(TOT)}$	$V_{DS} = -10V, I_D = -2.7A,$ $V_{GS} = -4.5V$		5.0	6.5	nC
Threshold gate charge	$Q_{G(TH)}$			0.4		nC
Gate-Source Charge	Q_{GS}			1.4		nC
Gate-Drain Charge	Q_{GD}			0.9		nC
Drain-Source Diode Characteristics and Maximum Ratings						
Forward Diode Voltage	V_{SD}	$V_{GS} = 0V, I_S = -1.5A$			-1.15	V

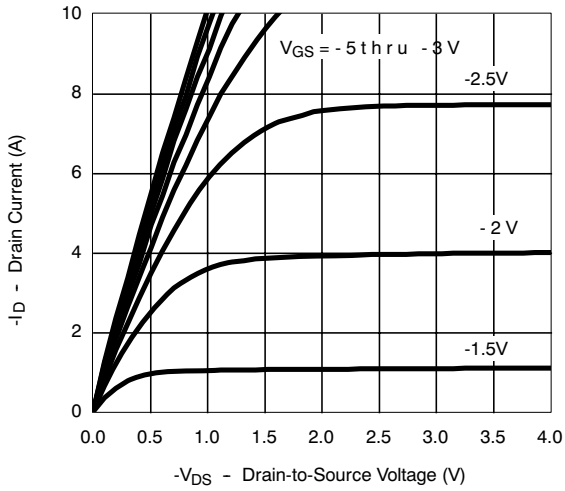
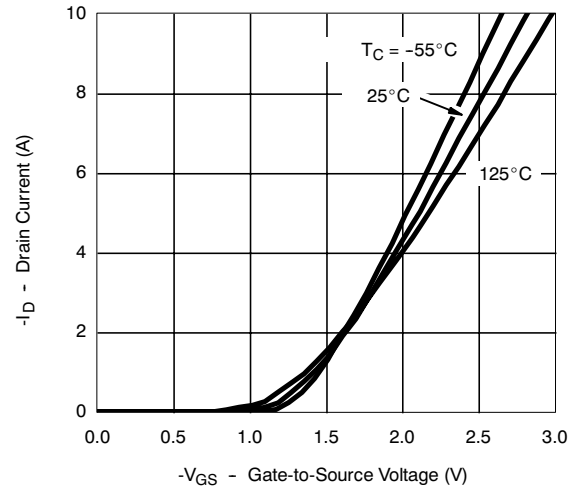
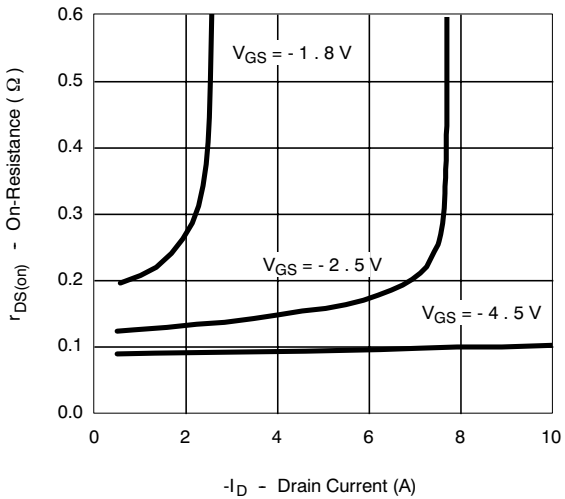
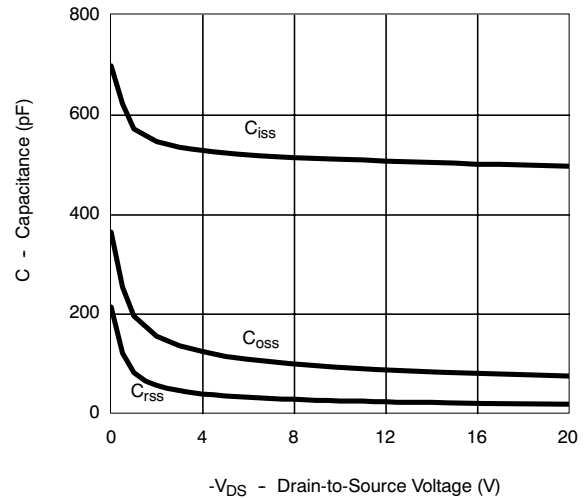
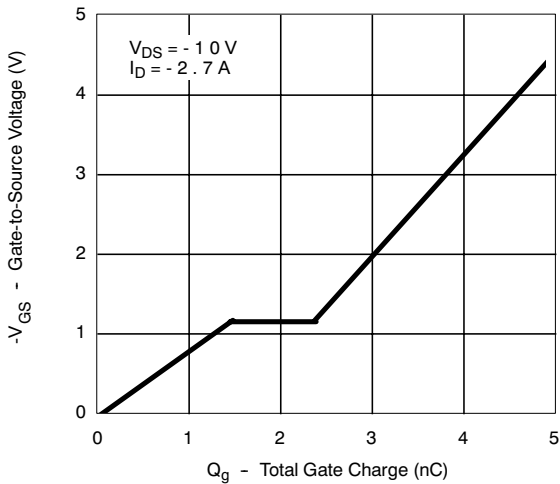
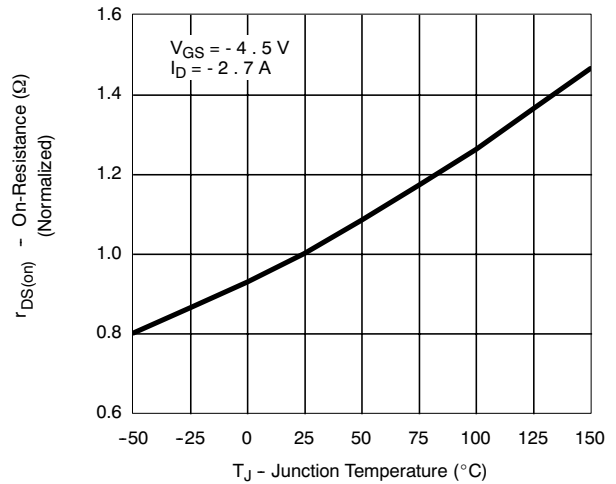
SCHOTTKY DIODE ELECTRICAL CHARACTERISTICS ($T_J = 25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Forward voltage	V_{F1}		0.425		V	$I_F = 0.1A$
	V_{F2}		0.480			$I_F = 0.5A$
	V_{F3}			0.575		$I_F = 1A$
Reverse current	I_{R1}			5	μA	$V_R = 10V$
	I_{R2}			15	μA	$V_R = 20V$

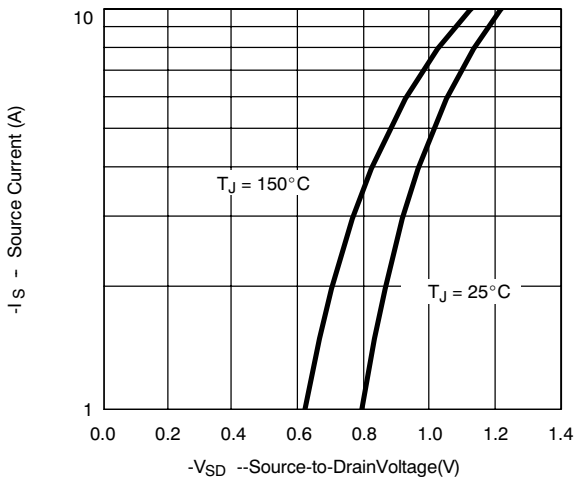
Welding temperature curve


MSL=1

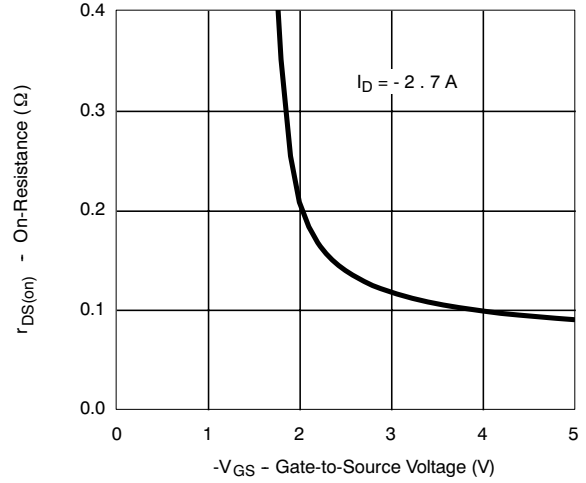
Typical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature


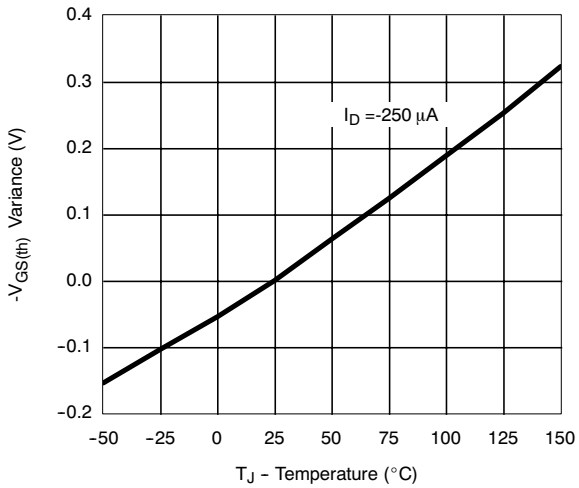
Source-Drain Diode Forward Voltage



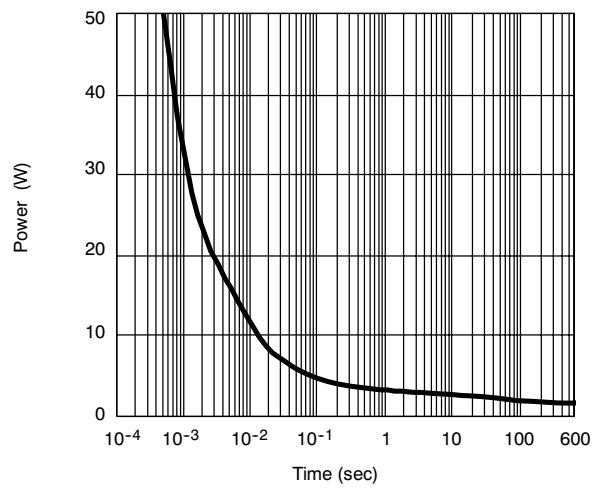
On-Resistance vs. Gate-to-Source Voltage



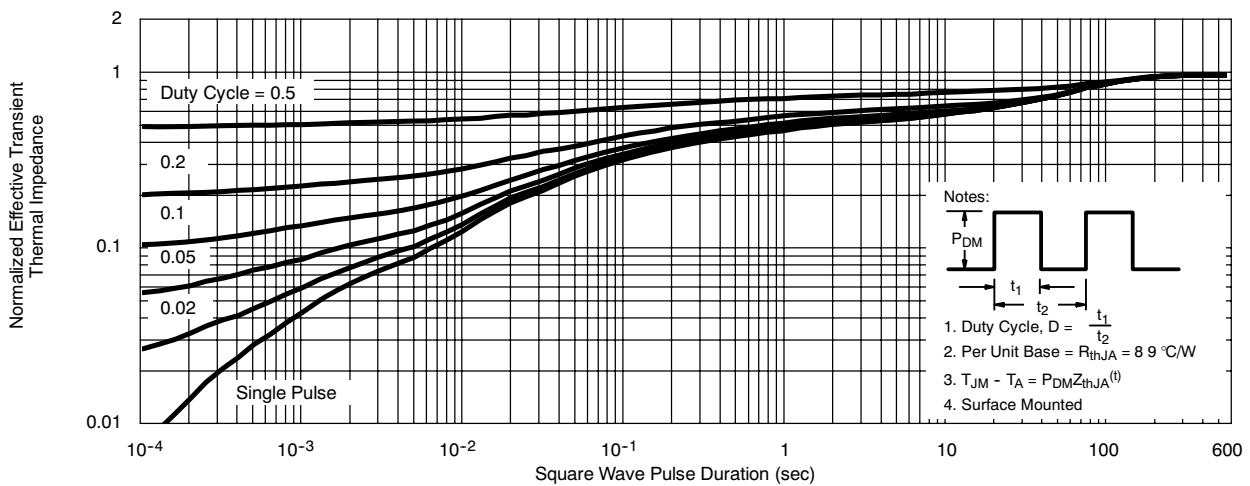
Threshold Voltage



Single Pulse Power

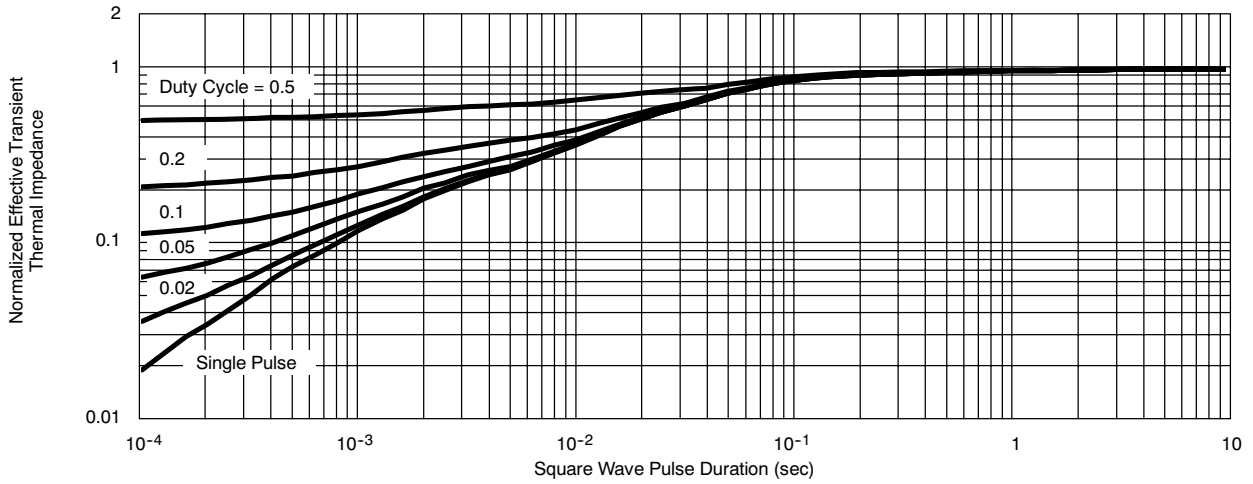


Normalized Thermal Transient Impedance, Junction-to-Ambient

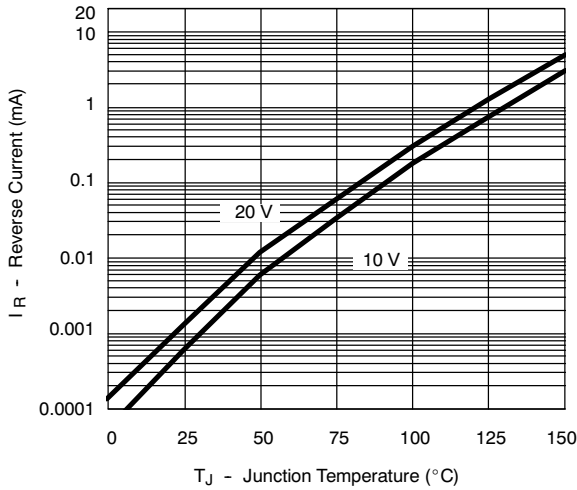




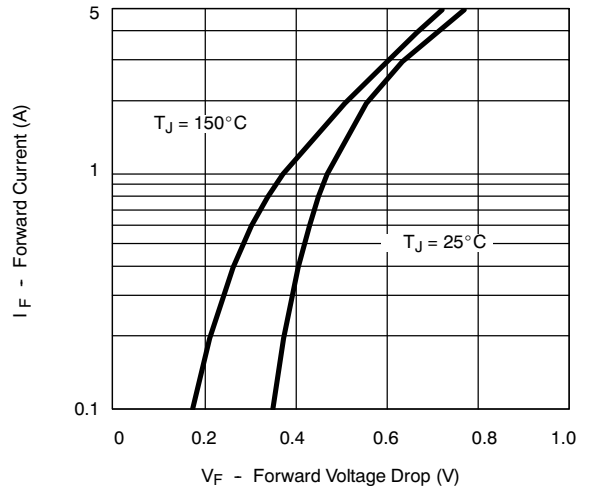
Normalized Thermal Transient Impedance, Junction-to-Foot



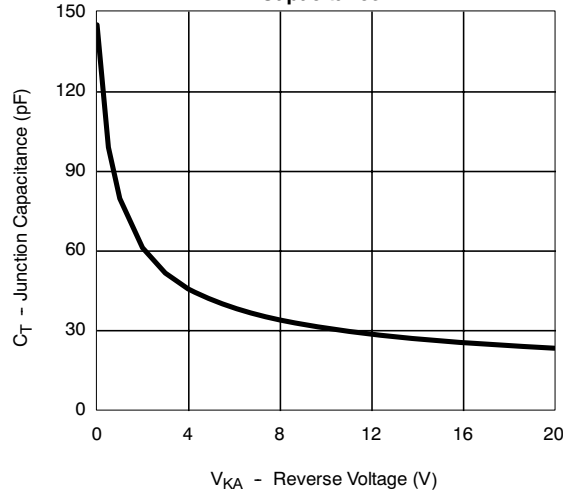
Reverse Current vs. Junction Temperature



Forward Voltage Drop

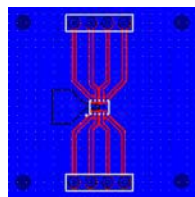


Capacitance

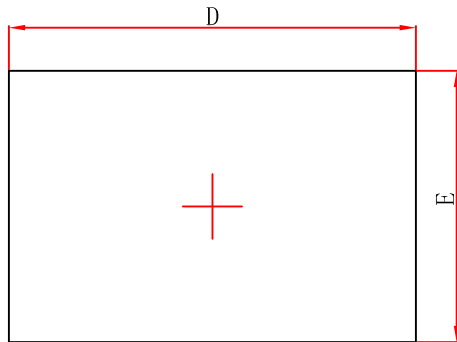
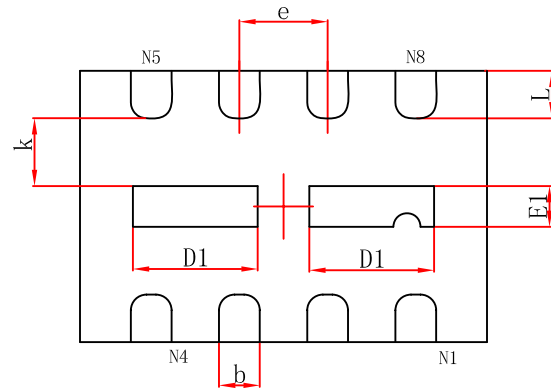
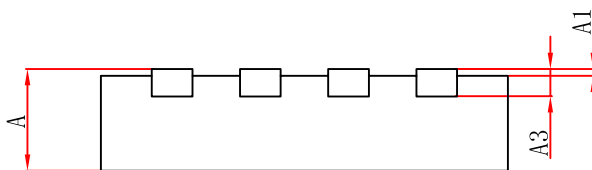


Power Dissipation Characteristics

1. The package of WPM2005 is DFN3x2-8L, surface mounted on FR4 Board using 1 in sq pad size, 1 oz Cu, $R_{\theta JA}$ is 89 °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.



89 °C/W when mounted on
a 1 in² pad of 1 oz copper.

DFNWB3X2-8L(P0.65T0.75/0.85) PACKAGE OUTLINE DIMENSIONS

Top View

Bottom View

Side View

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700/0.800	0.800/0.900	0.028/0.031	0.031/0.035
A1	0.000	0.050	0.000	0.002
A3	0.153	0.253	0.006	0.010
D	2.9	3.1	0.114	0.122
E	1.9	2.1	0.075	0.083
D1	0.82	1.020	0.032	0.040
E1	0.200	0.400	0.008	0.016
k	0.300MIN.		0.010MIN.	
b	0.250	0.350	0.010	0.014
e	0.650TYP.		0.026TYP.	
L	0.250	0.350	0.010	0.014

DFN 3X2-8L PCB Layout Guide

