

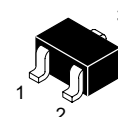
# WPM1480

## Single P-Channel, -20 V, -1.5 A, Power Mosfet

<http://www.willsemi.com>

### Description

The WPM1480 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. This device is suitable for use in DC-DC conversion applications. Standard Product WPM1480 is Pb-free.

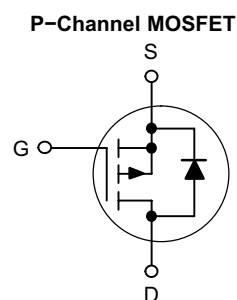

**SC-70/SOT-323**

### Features

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ
-20 V	110 m $\Omega$ @ -4.5 V
	150 m $\Omega$ @ -2.5 V

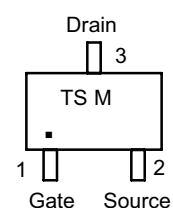
### Application

- 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



### Absolute Maximum Ratings (TA=25 unless otherwise specified)

Parameter	Symbol		Value	Units	
$V_{DS}$	Drain-Source voltage		-20	V	
$V_{GS}$	Gate-Source Voltage		$\pm 8$	V	
$I_D$	Continuous Drain Current <sup>A</sup>	Steady-State TA=25°C	-1.4	A	
		Steady-State TA=70°C	-1.1		
		$t \leq 5s$ TA=25°C	-1.5		
$I_{DM}$	Pulse Drain Current <sup>B</sup>		TP=10us	-3.0	A
$P_D$	Power Dissipation <sup>B</sup>	TA=25°C	0.29	W	
		TA=70°C	0.19		
$T_J$	Operating Junction Temperature Range		-55~150	°C	
$T_{stg}$	Storage Temperature Range				



TS = Specific Device Code  
M = Date Code

### Order information

Part Number	Part Number	Shipping
WPM1480-3/TR	SOT-323/SC-70	3000Tape&Reel

## Electrical Characteristics

### OFF

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$BV_{DSS}$	Drain-Source Voltage	$I_D = -250\mu A, V_{GS} = 0V$	-20			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = -16V, V_{GS} = 0V$			-1	$\mu A$
		$T_C = 25^\circ C$				
		$T_C = 55^\circ C$			-5	$\mu A$
$I_{GSS}$	Gate-body Leakage Current	$V_{DS} = 0V, V_{GS} = \pm 8V$			$\pm 100$	nA

### ON

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\mu A$	-0.4	-0.6	-1.0	V
$R_{DS(on)}$	Static Drain-Source On resistance	$V_{GS} = -4.5V, I_D = -1.0A$		110	255	m $\Omega$
		$V_{GS} = -2.5V, I_D = -0.5A$		150	355	m $\Omega$
		$V_{GS} = -1.8V, I_D = -0.3A$		190	405	m $\Omega$

### Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$g_{FS}$	Transconductance	$V_{DS} = -10V, I_D = -1A$	4	6		S
$C_{iss}$	Input Capacitance	$V_{DS} = -10V, V_{GS} = 0V, f = 1MHz$		480		pF
$C_{oss}$	Output Capacitance			58		pF
$C_{rss}$	Reverse Transfer Capacitance			51		pF
$R_g$	Gate Resistance	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		12		$\Omega$

### Switching

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$Q_g$	Total Gate Charge	$V_{GS} = -4.5V, I_D = -1.2A, V_{DS} = -10V$		6.5		nC
$Q_{gs}$	Gate Source Charge			0.3		nC
$Q_{gd}$	Gate Drain Charge			0.7		nC
$t_{D(on)}$	Turn-On Delay Time	$V_{GS} = -4.5V, V_{DS} = -10V, I_D = -1.2A, R_{GEN} = 6\Omega$		8.0		ns
$t_r$	Turn-On Rise Time			6.0		ns
$t_{D(off)}$	Turn-Off Delay Time			42		ns
$t_f$	Turn-Off Fall Time			7.0		ns

### Source Drain Diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Units
$V_{SD}$	Diode Forward Voltage	$I_S = -1A, V_{GS} = 0V$		-0.79	-1.5	V
$I_S$	Maximum Body-diode Continuous Current				-1	A
$t_{rr}$	Body-diode Reverse Recovery Time	$I_S = -1.0A, di/dt = 100A/\mu s$		30		ns
$Q_{rr}$	Body-diode Reverse Recovery Charge			12		nC

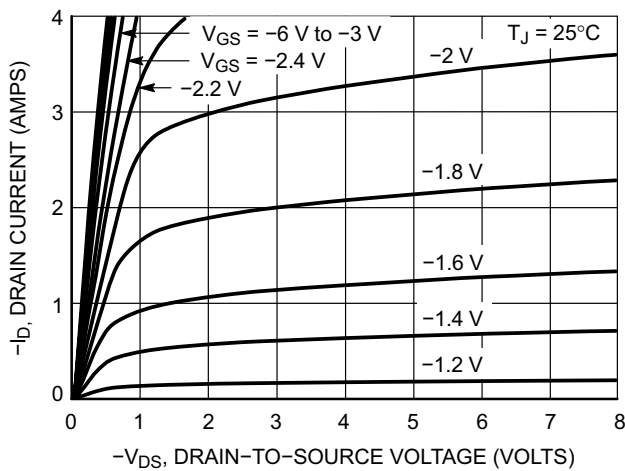
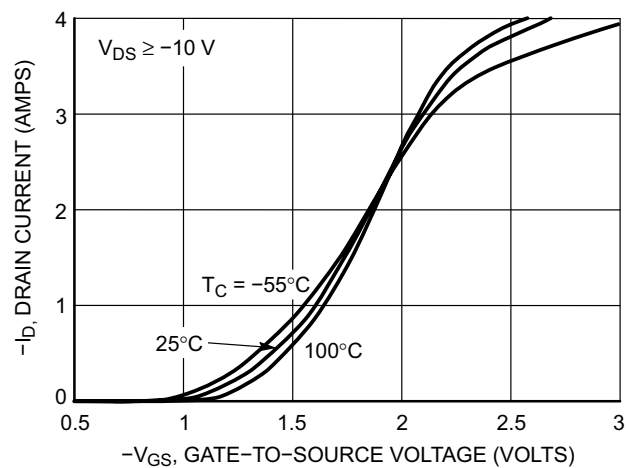
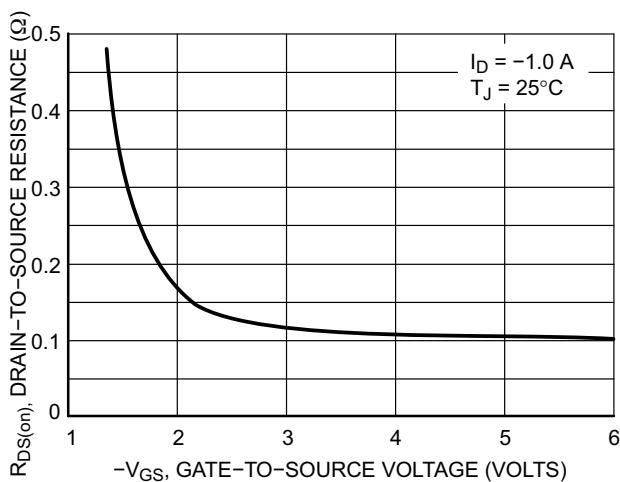
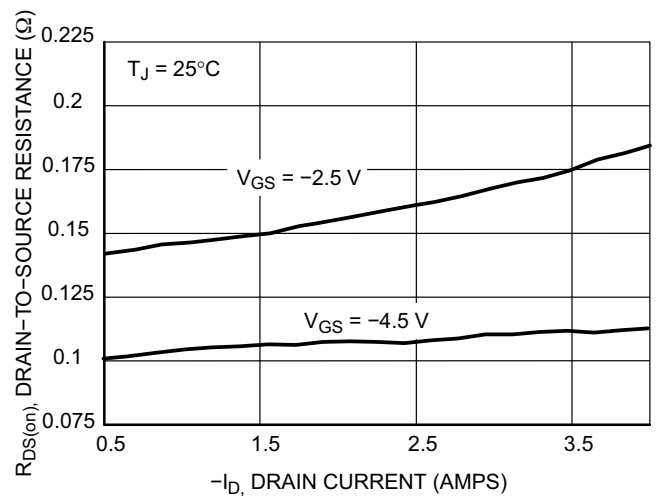
**Thermal Characteristic**

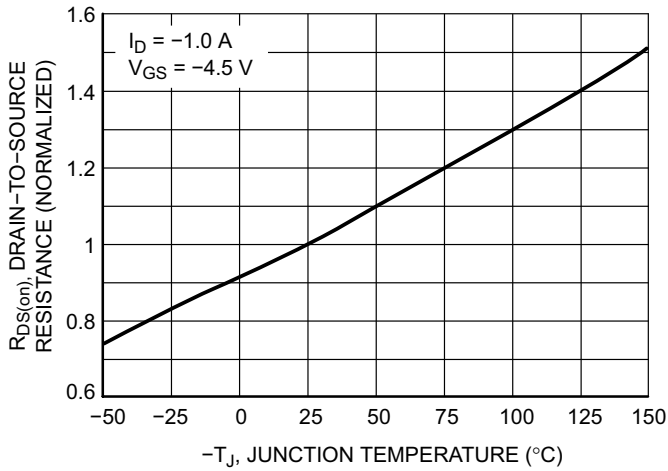
Symbol	Parameter	Typ.	Max.	Unit.	
$R_{\theta JA}$	Junction to Ambient <sup>A</sup>	$t \leq 5\mu s$	250	375	$^{\circ}C/W$
		Steady-State	345	430	$^{\circ}C/W$
$R_{\theta JL}$	Junction to Lead <sup>C</sup>	Steady-State	80	100	$^{\circ}C/W$

A: Surface-mounted on FR4 board using 1" sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

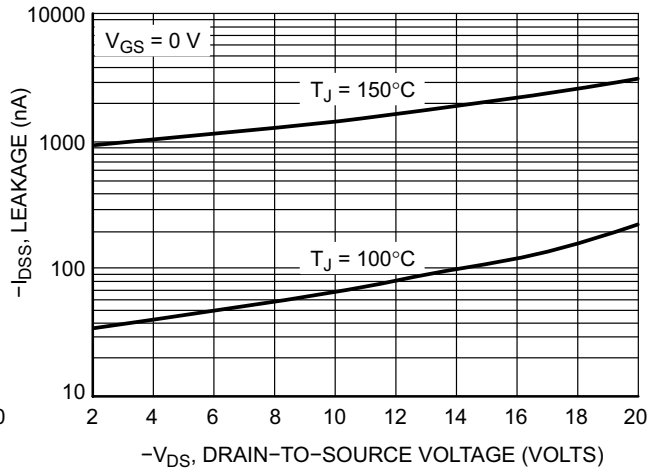
B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient

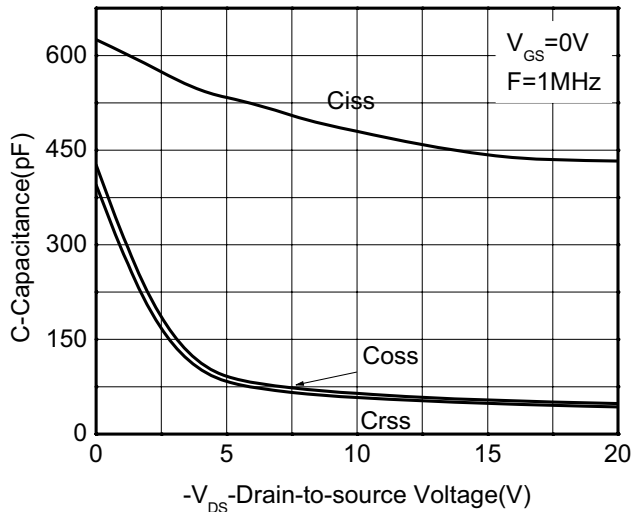
**Typical Performance Characteristics**

**Figure 1. On-Region Characteristics**

**Figure 2. Transfer Characteristics**

**Figure 3. On-Resistance vs. Gate-to-Source Voltage**

**Figure 4. On-Resistance vs. Drain Current and Gate Voltage**



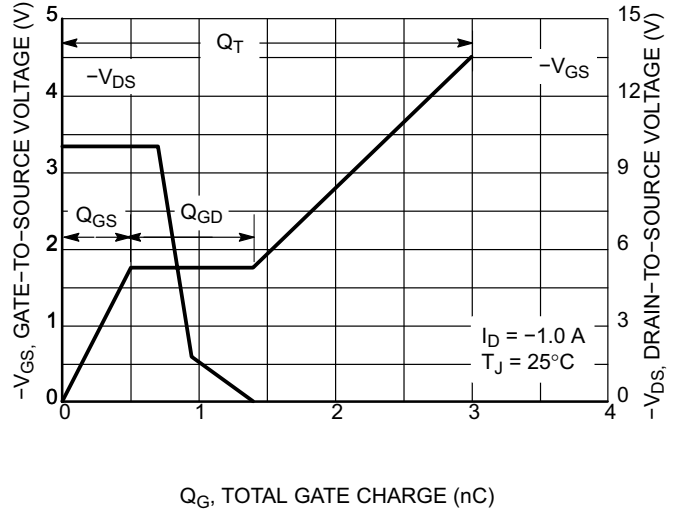
**Figure 5. On-Resistance Variation with Temperature**



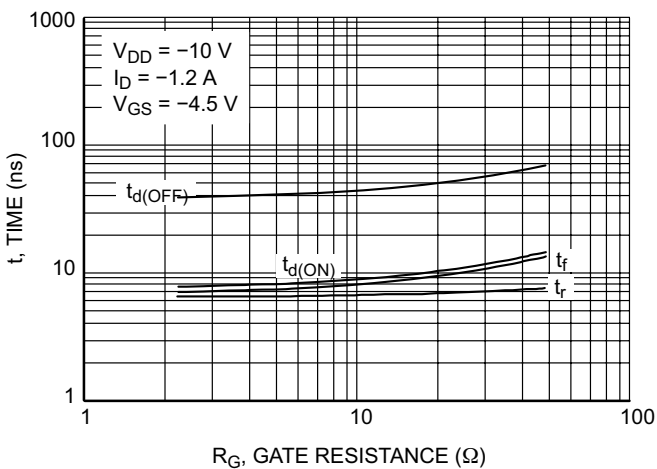
**Figure 6. Drain-to-Source Leakage Current vs. Voltage**



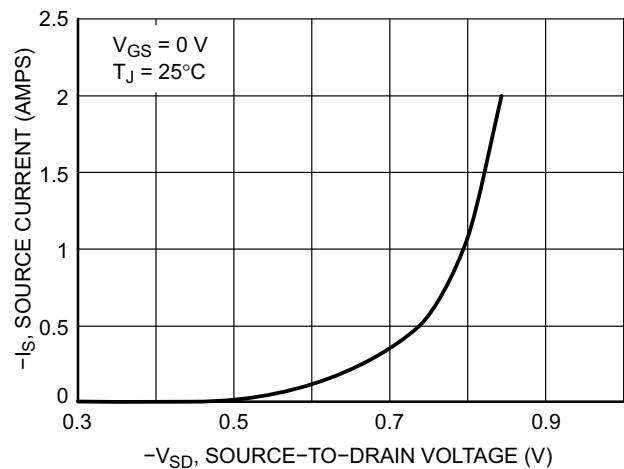
**Figure 7. Capacitance Variation**



**Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge**



**Figure 9. Resistive Switching Time Variation vs. Gate Resistance**



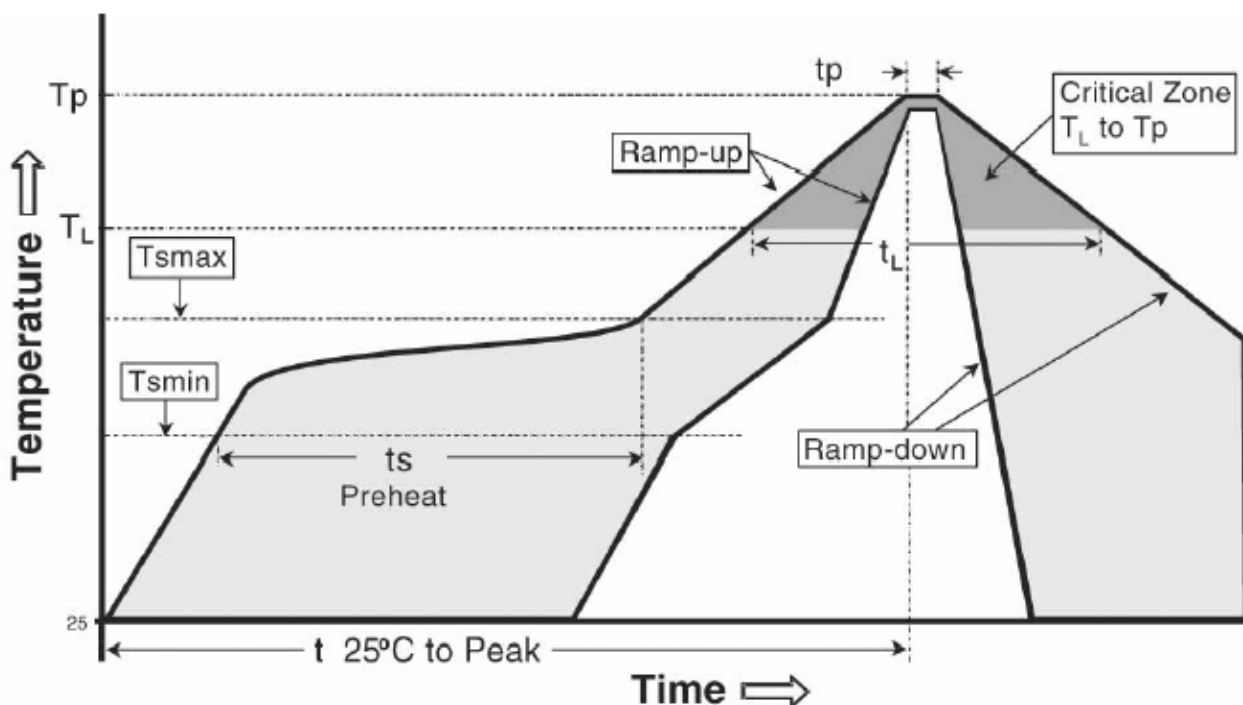
**Figure 10. Diode Forward Voltage vs. Current**

表 回流焊试验条件

回流焊条件	无铅电镀产品	
	塑封体厚度 $\geq 2.5$ mm 或塑封体体积 $\geq 350$ mm <sup>3</sup>	塑封体厚度 $< 2.5$ mm 且塑封体体积 $< 350$ mm <sup>3</sup>
温度上升速率	3 °C/second max.	
预热温度 -低温 (Ts(min)) -高温 m(Ts(ax)) -时间 (低温到高温) (ts)	150 °C 200 °C 60-180 seconds	
从预热温度Ts(max)到维持温度TL - 温升速率	3 °C/second max.	
Time maintained above: - 温度 (TL) - 时间(tL)	217 °C 60-150 seconds	
波峰温度 (Tp)	245+0/-5 °C	260+0/-5 °C
维持在波峰温度的时间 Temperature (tp)	10-30seconds	20-40seconds
降温速率	6 °C/second max.	
从 25 °C到波峰温度的时间	8 minutes max.	

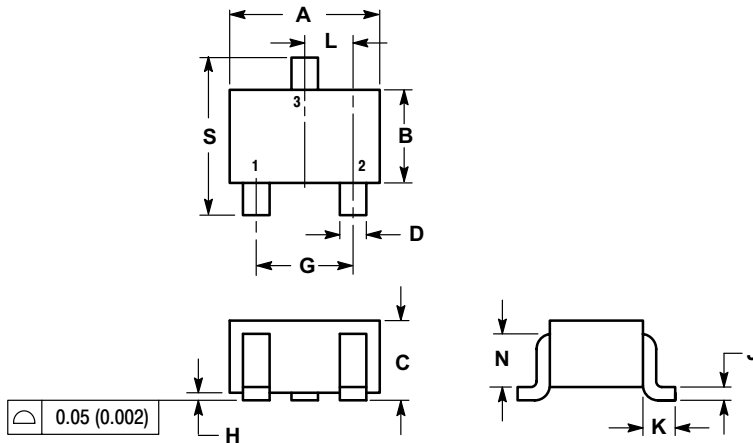
注：所有的温度都是指样品上部塑封体表面的温度。

#### Welding temperature curve



## Packaging Information

### SOT-323/SC-70 Package Outline Dimension



- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.032	0.040	0.80	1.00
D	0.012	0.016	0.30	0.40
G	0.047	0.055	1.20	1.40
H	0.000	0.004	0.00	0.10
J	0.004	0.010	0.10	0.25
K	0.017 REF		0.425 REF	
L	0.026 BSC		0.650 BSC	
N	0.028 REF		0.700 REF	
S	0.079	0.095	2.00	2.40

- STYLE 8:  
 PIN 1. GATE  
 2. SOURCE  
 3. DRAIN

### SOLDERING FOOTPRINT

