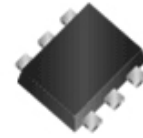


WPMD2013

Dual P-Channel, -20V, -0.64A, Small Signal MOSFET

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

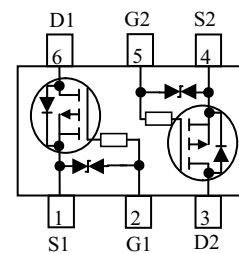
V_{DS} (V)	$R_{ds(on)}$ (Ω)
-20	0.550@ $V_{GS}=-4.5V$
	0.740@ $V_{GS}=-2.5V$
	0.860@ $V_{GS}=-1.8V$



SOT-563

Descriptions

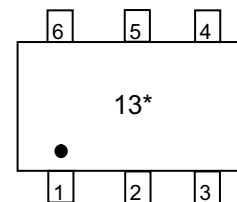
The WPMD2013 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in DC-DC conversion, load switch and level shift. Standard Product WPMD2013 is Pb-free.



Pin configuration (Top view)

Features

- Trench Technology
- Supper high density cell design
- Excellent ON resistance
- Extremely Low Threshold Voltage
- Small package SOT-563



13 = Device Code

* = Month (A~Z)

Marking

Applications

- DC-DC converter circuit
- Small Signal Switch
- Load Switch
- Level Shift

Order information

Device	Package	Shipping
WPMD2013-6/TR	SOT-563	3000/Reel&Tape

Absolute Maximum ratings

Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		V_{DS}	-20		V
Gate-Source Voltage		V_{GS}	± 6		
Continuous Drain Current ^a	$T_A=25^\circ\text{C}$	I_D	-0.64	-0.56	A
	$T_A=70^\circ\text{C}$		-0.51	-0.45	
Maximum Power Dissipation ^a	$T_A=25^\circ\text{C}$	P_D	0.37	0.29	W
	$T_A=70^\circ\text{C}$		0.23	0.18	
Continuous Drain Current ^b	$T_A=25^\circ\text{C}$	I_D	-0.54	-0.50	A
	$T_A=70^\circ\text{C}$		-0.43	-0.40	
Maximum Power Dissipation ^b	$T_A=25^\circ\text{C}$	P_D	0.27	0.22	W
	$T_A=70^\circ\text{C}$		0.17	0.14	
Pulsed Drain Current ^c		I_{DM}	-1.0		A
Operating Junction Temperature		T_J	150		$^\circ\text{C}$
Storage Temperature Range		T_{stg}	-55 to 150		$^\circ\text{C}$

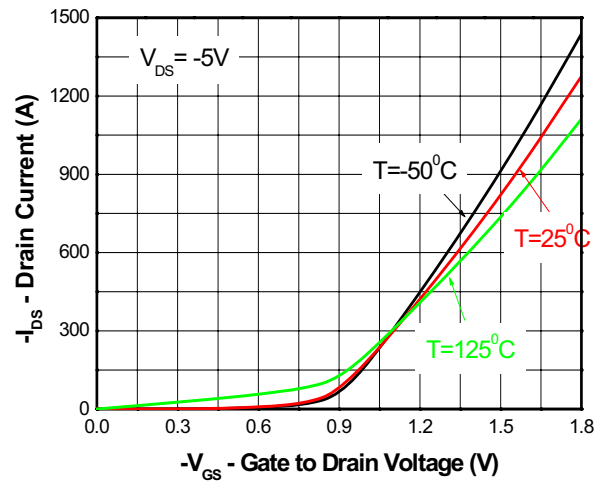
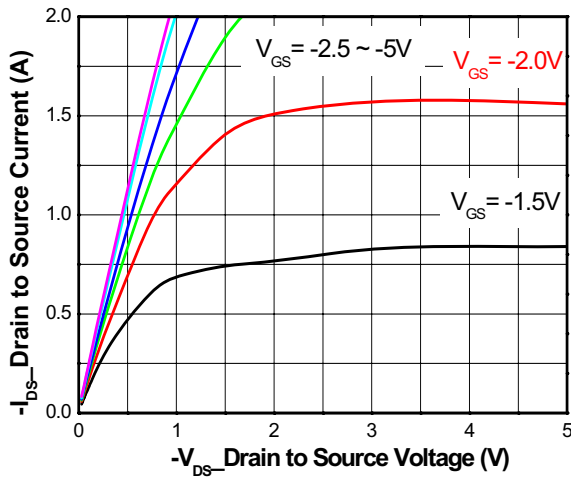
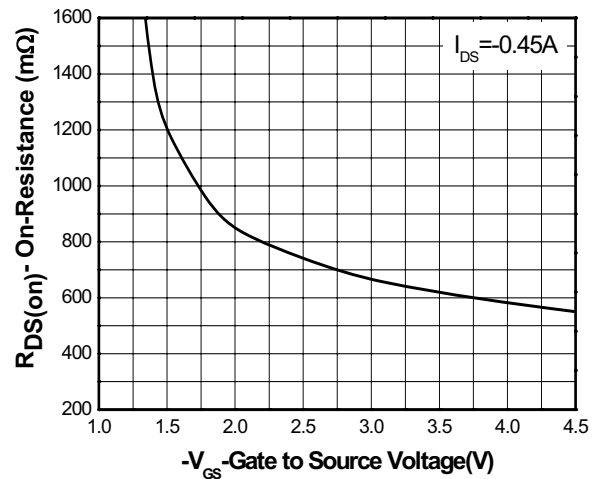
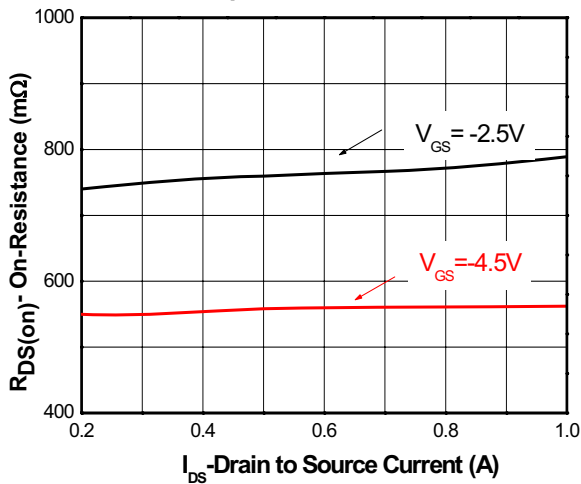
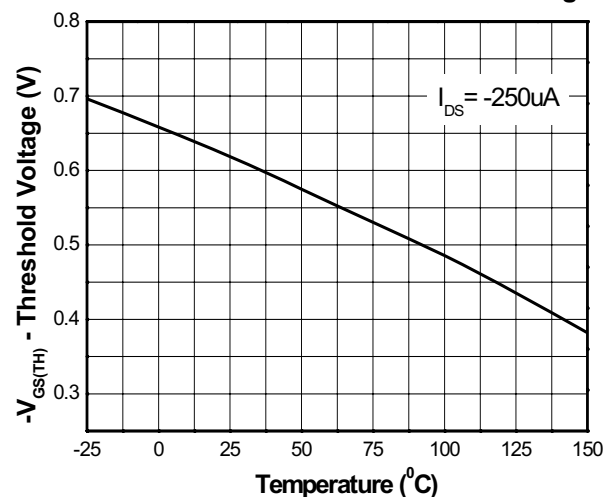
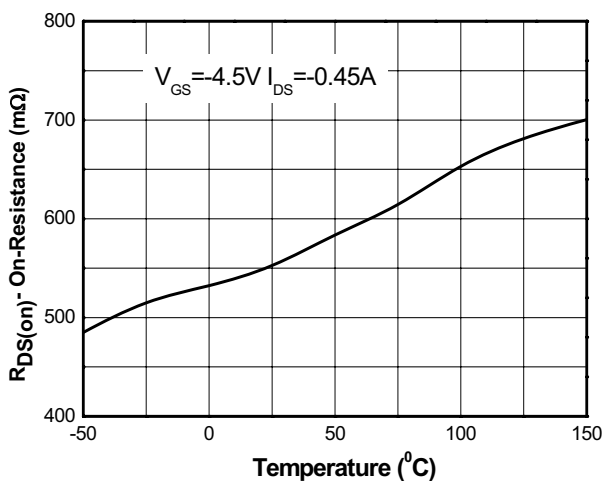
Thermal resistance ratings

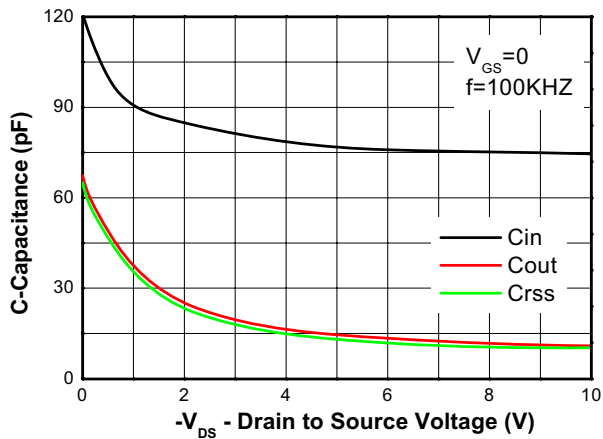
Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	285	335	$^\circ\text{C/W}$
	Steady State		350	430	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	380	460	
	Steady State		465	555	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	280	320	
Dual Operation					
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10 \text{ s}$	$R_{\theta JA}$	317	370	
	Steady State		375	445	
Junction-to-Ambient Thermal Resistance ^b	$t \leq 10 \text{ s}$	$R_{\theta JA}$	425	492	
	Steady State		505	590	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	285	325	

- Surface mounted on FR4 Board using 1 in sq pad size, 1oz Cu.
- Surface mounted on FR4 board using the minimum recommended pad size, 1oz Cu.
- Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%
- Repetitive rating, pulse width limited by junction temperature $T_J(\text{MAX})=150^\circ\text{C}$

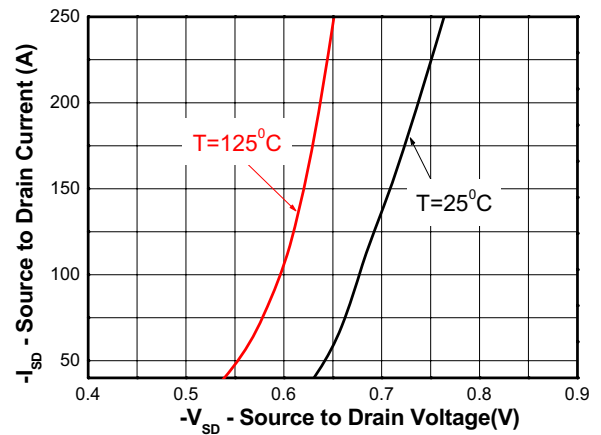
Electronics Characteristics (Ta=25°C, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} = 0 V, I _D = -250uA	-20			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -20 V, V _{GS} = 0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±5V			-5	uA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = -250uA	-0.40	-0.65	-0.90	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} = -4.5V, I _D = -0.45A		550	810	mΩ
		V _{GS} = -2.5V, I _D = -0.35A		740	1050	
		V _{GS} = -1.8V, I _D = -0.25A		860	1300	
Forward Transconductance	g _{FS}	V _{DS} = -5 V, I _D = -0.45A		1.25		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 100KHz, V _{DS} = -10 V		74.5		pF
Output Capacitance	C _{OSS}			10.8		
Reverse Transfer Capacitance	C _{RSS}			10.2		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.45A		1.8		nC
Threshold Gate Charge	Q _{G(TH)}			0.12		
Gate-to-Source Charge	Q _{GS}			0.18		
Gate-to-Drain Charge	Q _{GD}			0.74		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	td(ON)	V _{GS} = -4.5 V, V _{DS} = -10 V, I _D = -0.45A, R _G = 6 Ω		45		ns
Rise Time	tr			140		
Turn-Off Delay Time	td(OFF)			1500		
Fall Time	tf			2100		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} = 0 V, I _S = -0.15A	-0.50	-0.65	-1.50	V

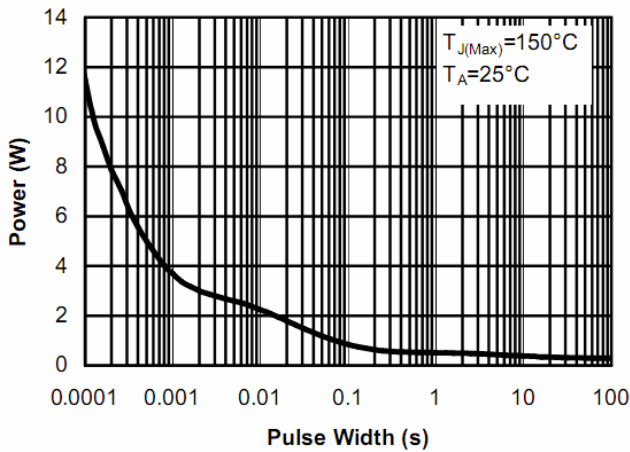
Typical Characteristics (Ta=25°C, unless otherwise noted)

Output characteristics
Transfer characteristics

On-Resistance vs. Drain current
On-Resistance vs. Gate-to-Source voltage

On-Resistance vs. Junction temperature
Threshold voltage vs. Temperature



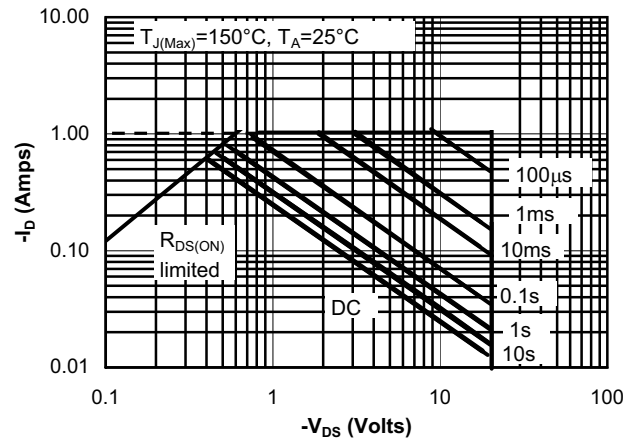
Capacitance



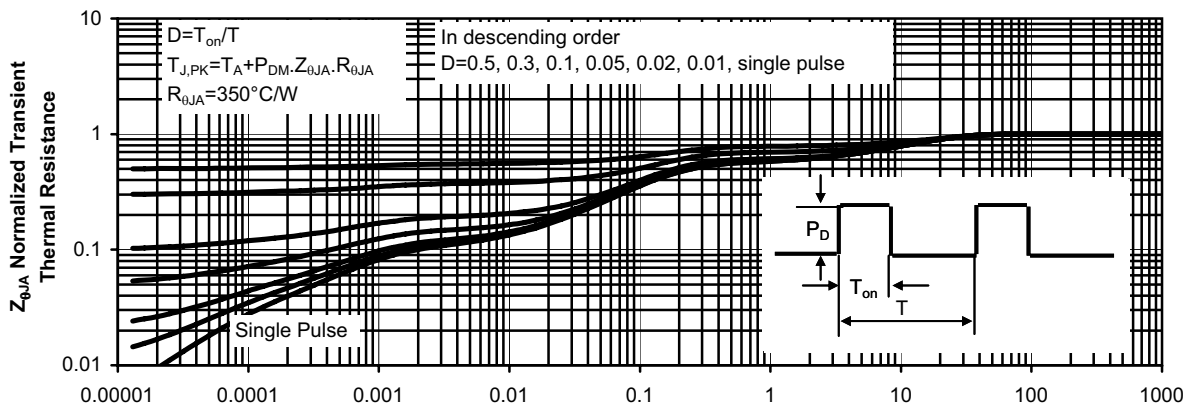
Body diode forward voltage



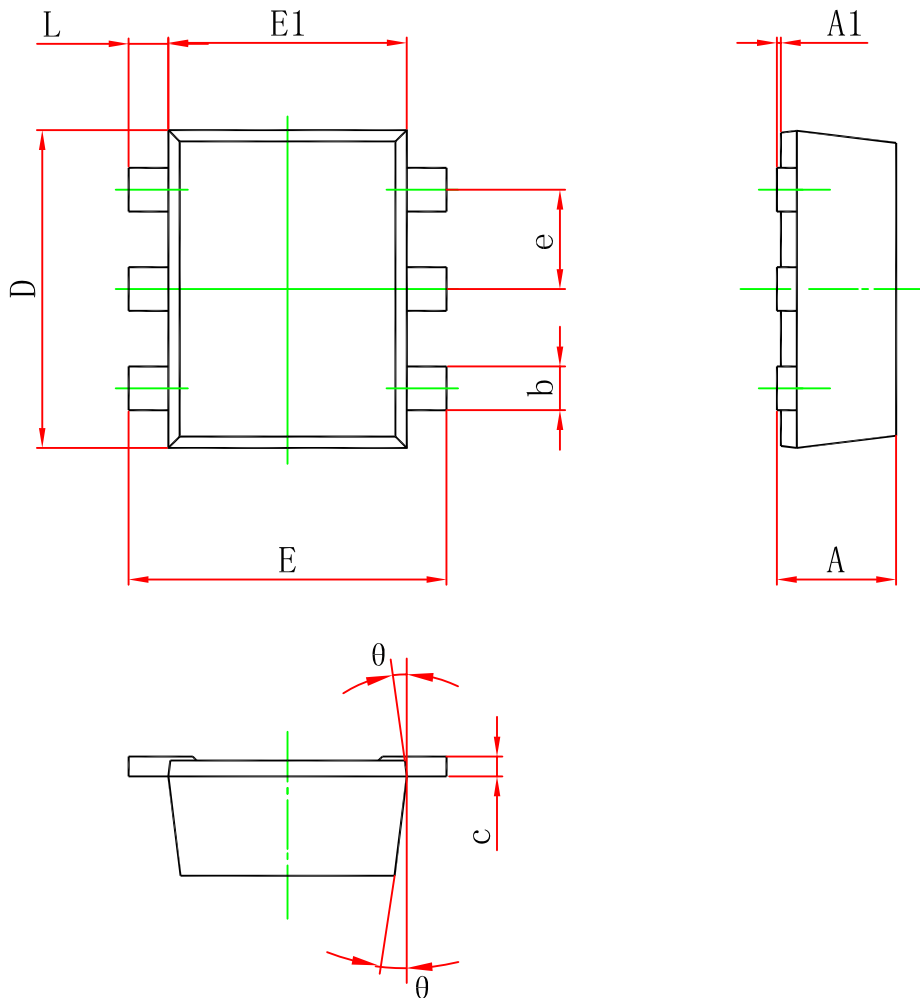
Single pulse power



Safe operating power



Transient thermal response (Junction-to-Ambient)

Package Outline Dimension
SOT-563


Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.525	0.563	0.600
A1	0.000	0.025	0.050
e	0.450	0.500	0.550
c	0.090	0.125	0.160
D	1.500	1.600	1.700
b	0.170	0.22	0.270
E1	1.100	1.200	1.300
E	1.500	1.600	1.700
L	0.100	0.200	0.300
θ	7° REF		