

**Single P-Channel, -20V, -4.9A, Power MOSFET**

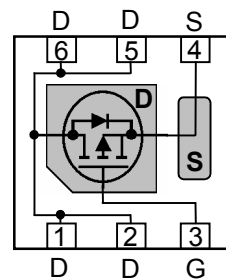
V <sub>DS</sub> (V)	R <sub>ds(on)</sub> (Ω)
-20	0.050 @ V <sub>GS</sub> = - 4.5V
	0.063 @ V <sub>GS</sub> = - 2.5V
	0.074 @ V <sub>GS</sub> = - 1.8V



DFN2x2-6L

**Descriptions**

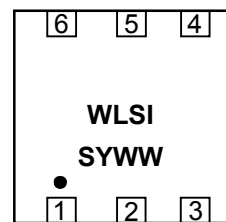
The WPM2014 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R<sub>DS (ON)</sub> with low gate charge. This device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product WPM2014 is Pb-free.



Pin configuration (Top view)

**Features**

- Trench Technology
- Supper high density cell design
- Excellent ON resistance for higher DC current
- Extremely Low Threshold Voltage
- Small package DFN2x2-6L



**WLSI** = Company code  
**S** = Device code  
**Y** = Year (Last digit)  
**WW** = Week  
**Marking**

**Applications**

- Driver for Relay, Solenoid, Motor, LED etc.
- DC-DC converter circuit
- Power Switch
- Load Switch
- Charging

**Order information**

Device	Package	Shipping
WPM2014-6/TR	DFN2x2-6L	3000/Reel&Tape

<b>ABSOLUTE MAXIMUM RATINGS (Ta = 25 °C, unless otherwise noted )</b>					
Parameter		Symbol	10 S	Steady State	Unit
Drain-Source Voltage		$V_{DS}$	-20		V
Gate-Source Voltage		$V_{GS}$	$\pm 8$		
Continuous Drain Current ( $T_J = 150\text{ °C}$ ) <sup>a</sup>	$T_A=25\text{ °C}$	$I_D$	-4.9	-4.1	A
	$T_A=70\text{ °C}$		-3.9	-3.2	
Maximum Power Dissipation <sup>a</sup>	$T_A=25\text{ °C}$	$P_D$	2.0	1.4	W
	$T_A=70\text{ °C}$		1.3	0.9	
Continuous Drain Current ( $T_J = 150\text{ °C}$ ) <sup>b</sup>	$T_A=25\text{ °C}$	$I_D$	-3.5	-2.9	A
	$T_A=70\text{ °C}$		-2.8	-2.3	
Maximum Power Dissipation <sup>b</sup>	$T_A=25\text{ °C}$	$P_D$	1.0	0.7	W
	$T_A=70\text{ °C}$		0.6	0.4	
Pulsed Drain Current <sup>c</sup>		$I_{DM}$	-20		A
Operating Junction Temperature		$T_J$	150		°C
Storage Temperature Range		$T_{stg}$	-55 to 150		°C

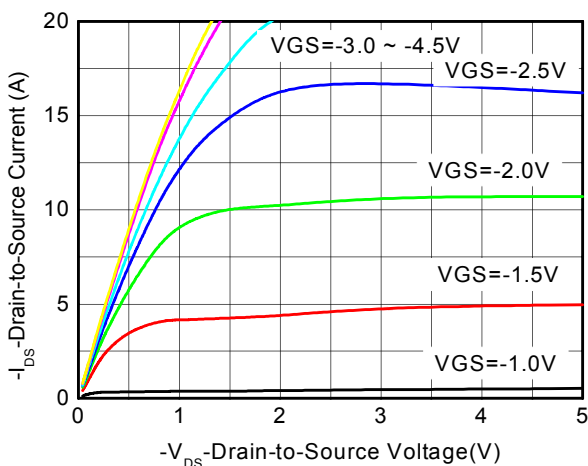
<b>THERMAL RESISTANCE RATINGS</b>					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance <sup>a</sup>	$t \leq 10\text{ s}$	$R_{\theta JA}$	45	60	°C/W
	Steady State		62	85	
Junction-to-Ambient Thermal Resistance <sup>b</sup>	$t \leq 10\text{ s}$	$R_{\theta JA}$	80	115	
	Steady State		120	170	
Junction-to-Case Thermal Resistance		$R_{\theta JC}$	32	40	

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

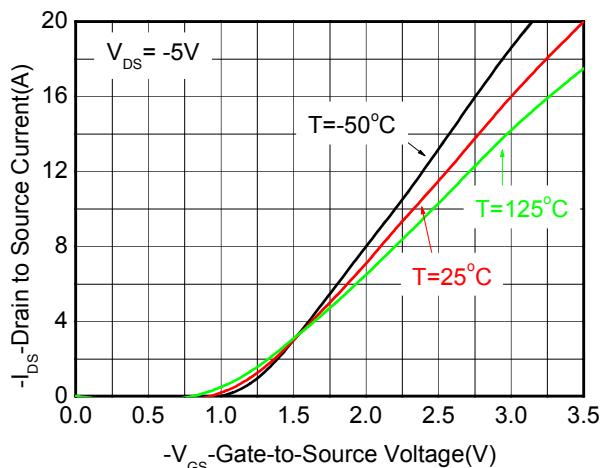
**Electronics Characteristics (Ta=25°C, unless otherwise noted)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>						
Drain-to-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS} = 0\text{ V}, I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -16\text{ V}, V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
Gate-to-source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8.0\text{ V}$			$\pm 100$	nA
<b>ON CHARACTERISTICS</b>						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = -250\mu\text{A}$	-0.4	-0.55	-0.9	V
Drain-to-source On-resistance	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}, I_D = -4.0\text{ A}$		50	60	m $\Omega$
		$V_{GS} = -2.5\text{ V}, I_D = -3.5\text{ A}$		63	72	
		$V_{GS} = -1.8\text{ V}, I_D = -2.3\text{ A}$		74	98	
Forward Transconductance	$g_{FS}$	$V_{DS} = -5\text{ V}, I_D = -3.5\text{ A}$		10		S
<b>CHARGES, CAPACITANCES AND GATE RESISTANCE</b>						
Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz},$ $V_{DS} = -6\text{ V}$		1200		pF
Output Capacitance	$C_{OSS}$			130		
Reverse Transfer Capacitance	$C_{RSS}$			115		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -4.5\text{ V}, V_{DS} = -6\text{ V},$ $I_D = -3.3\text{ A}$		11.5		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.7		
Gate-to-Source Charge	$Q_{GS}$			1.0		
Gate-to-Drain Charge	$Q_{GD}$			1.5		
<b>SWITCHING CHARACTERISTICS</b>						
Turn-On Delay Time	$t_d(ON)$	$V_{GS} = -4.5\text{ V}, V_{DS} = -6\text{ V},$ $R_L = 6\ \Omega, R_G = 3\ \Omega$		7.6		ns
Rise Time	$t_r$			5.5		
Turn-Off Delay Time	$t_d(OFF)$			62		
Fall Time	$t_f$			18		
<b>DRAIN-to-SOURCE DIODE CHARACTERISTICS</b>						
Forward Voltage	$V_{SD}$	$V_{GS} = 0\text{ V}, I_S = -1.6\text{ A}$	-0.5	-0.74	-1.5	V

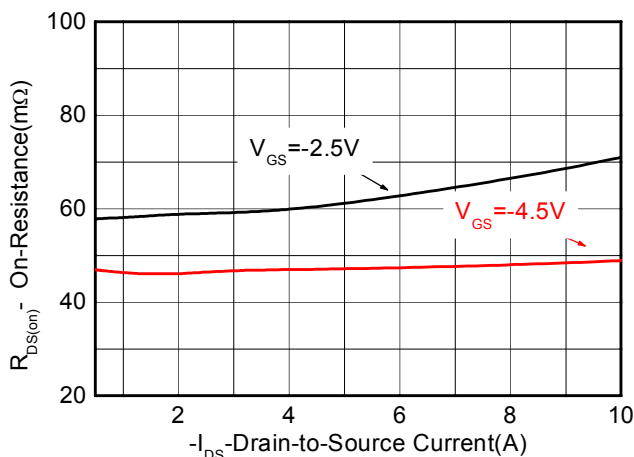
Typical Characteristics (Ta=25°C, unless otherwise noted)



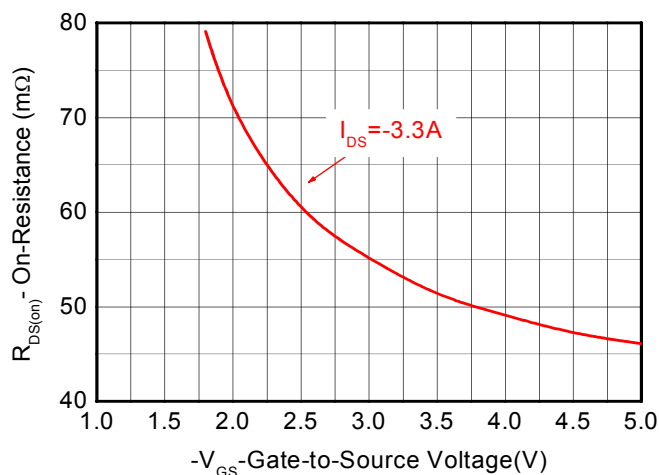
Output characteristics



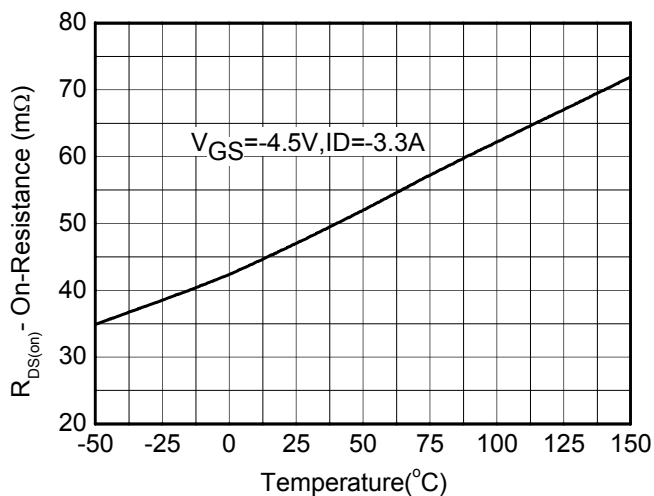
Transfer characteristics



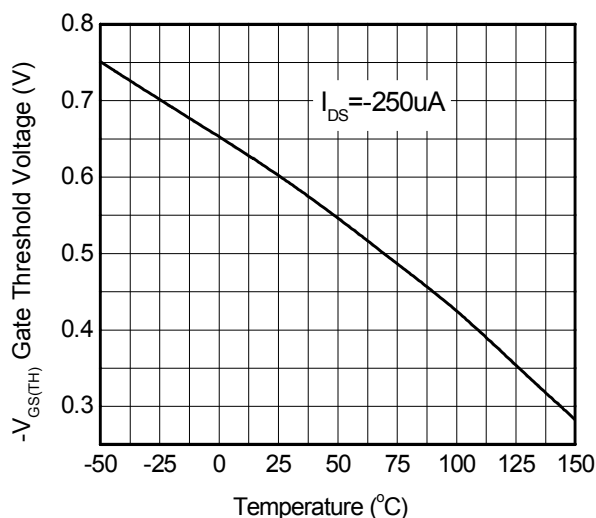
On-Resistance vs. Drain current



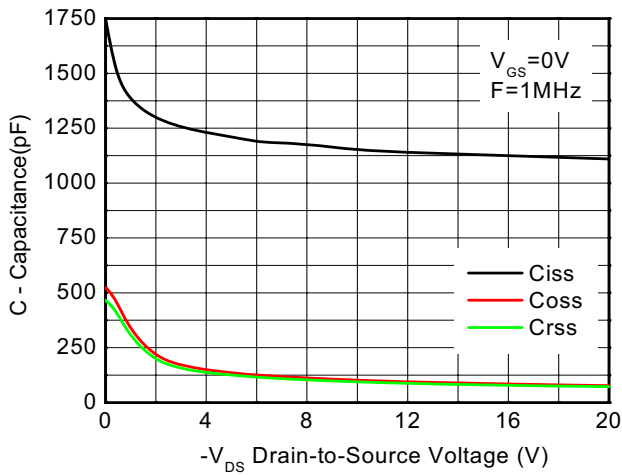
On-Resistance vs. Gate-to-Source voltage



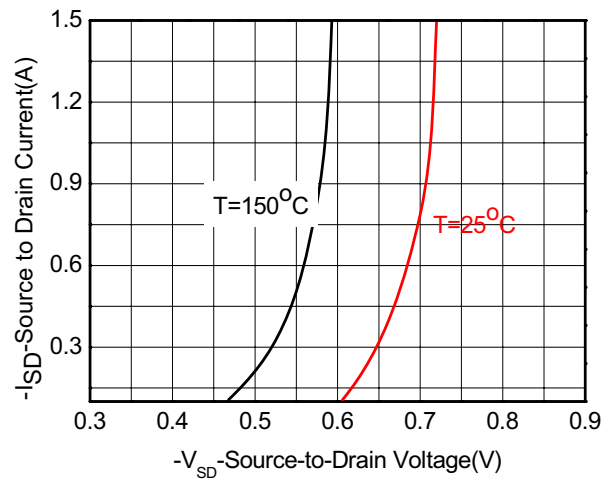
On-Resistance vs. Junction temperature



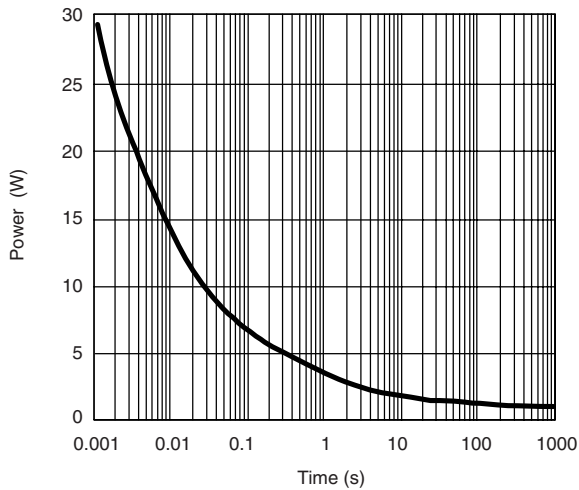
Threshold voltage vs. Temperature



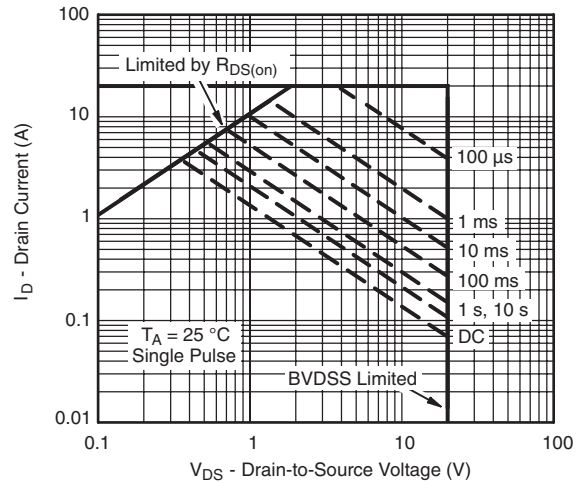
Capacitance



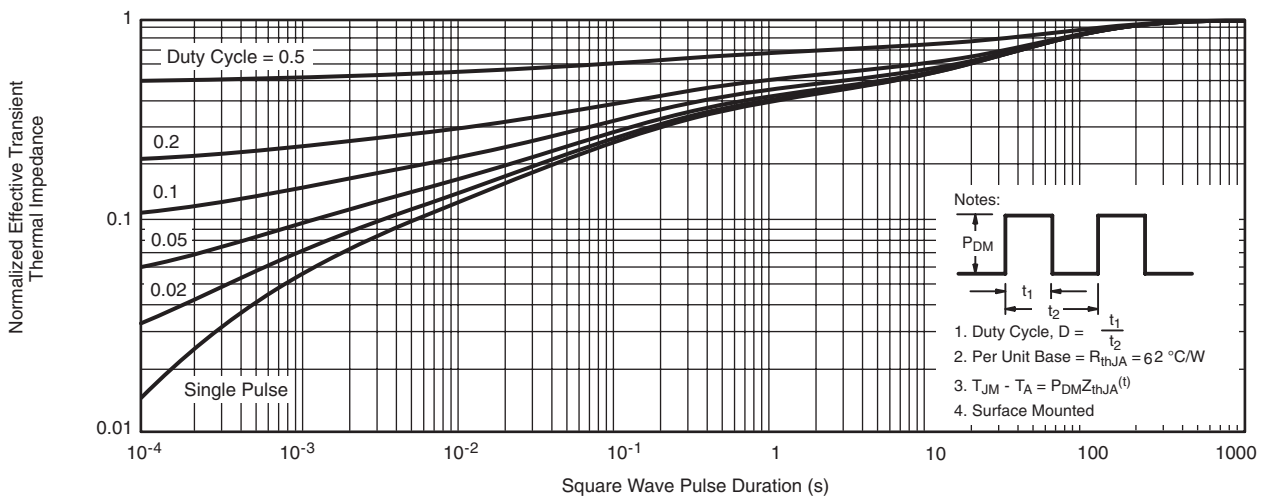
Drain-to-Source diode forward voltage



Single pulse power



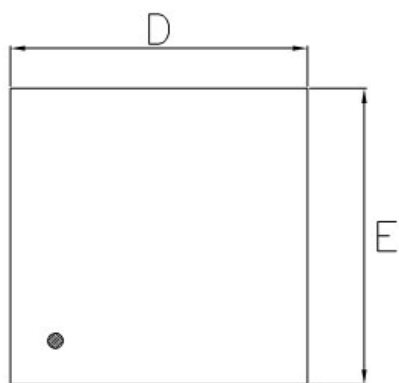
Safe operating power



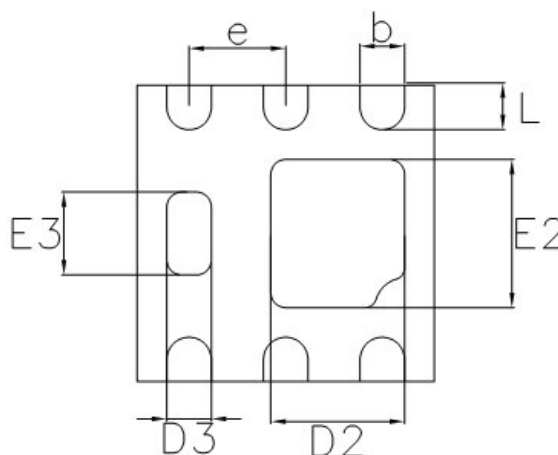
Transient thermal response (Junction-to-Ambient)

Package outline dimensions

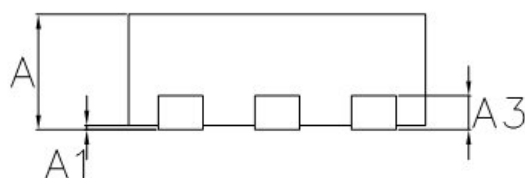
DFN2x2-6L



Top view



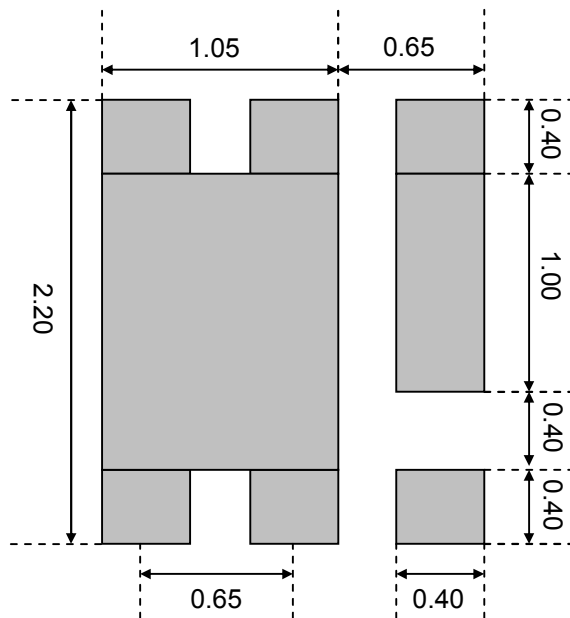
Bottom view



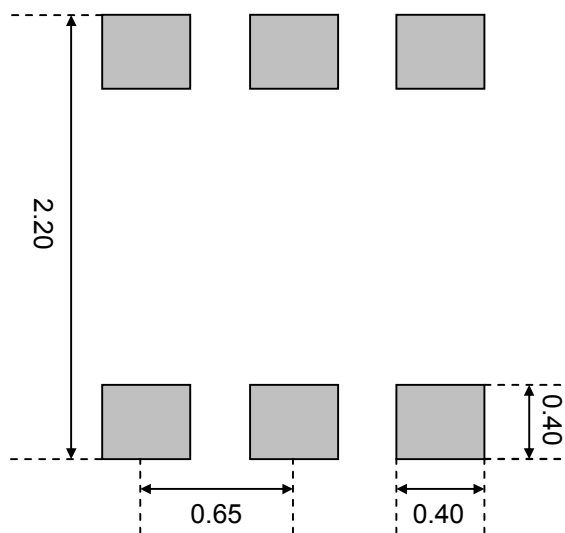
Side View

Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.70	0.75	0.80
A1	0.00	-	0.05
A3	0.20 Ref.		
D	1.95	2.00	2.05
E	1.95	2.00	2.05
D2	0.85	0.90	0.95
E2	0.95	1.00	1.05
D3	0.25	0.30	0.35
E3	0.51	0.56	0.61
b	0.25	0.30	0.35
L	0.25	0.30	0.30
e	0.65 BSC.		

**Recommend PCB Layout**  
(Unit: mm)



**Option 1: High power applications**



**Option 2: Normal applications**