

# FDW2504P-VB Datasheet

## P-Channel 20-V (G-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
-20	0.010 at $V_{GS} = -4.5$ V	-9.0
	0.012 at $V_{GS} = -2.5$ V	-7.8
	0.016 at $V_{GS} = -1.8$ V	-6.0

### FEATURES

- Halogen-free
- Trench Power MOSFETs



**RoHS\***  
COMPLIANT



### ABSOLUTE MAXIMUM RATINGS $T_A = 25^\circ\text{C}$ , unless otherwise noted

Parameter		Symbol	10 s	Steady State	Unit
Drain-Source Voltage		V <sub>DS</sub>	-20		V
Gate-Source Voltage		V <sub>GS</sub>	± 12		
Continuous Drain Current (T <sub>J</sub> = 150 °C) <sup>a</sup>	T <sub>A</sub> = 25 °C	I <sub>D</sub>	- 9.0	-7.8	A
	T <sub>A</sub> = 70 °C		- 6.8	-5.8	
Pulsed Drain Current (10 μs Pulse Width)		I <sub>DM</sub>	- 30		
Continuous Source Current (Diode Conduction) <sup>a</sup>		I <sub>S</sub>	- 1.35	- 0.95	W
Maximum Power Dissipation <sup>a</sup>	T <sub>A</sub> = 25 °C	P <sub>D</sub>	1.5	1.05	
	T <sub>A</sub> = 70 °C		1.0	0.67	
Operating Junction and Storage Temperature Range		T <sub>J</sub> , T <sub>stg</sub>	- 55 to 150		°C

### THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$t \leq 10$ s	$R_{thJA}$	65	83	$^\circ\text{C/W}$
	Steady State		100	120	
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	43	52	

Notes:

a. Surface Mounted on 1" x 1" FR4 board.

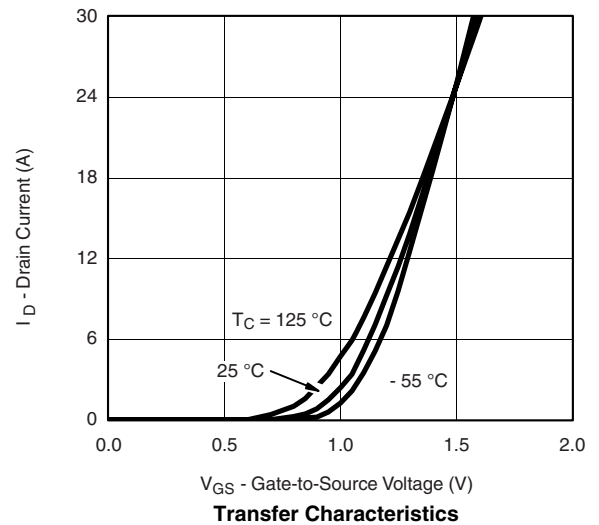
<b>SPECIFICATIONS</b> $T_J = 25\text{ }^{\circ}\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$ , $I_D = -450\text{ }\mu\text{A}$	-0.45	-	1.0	V
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}$ , $V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$			-1	$\mu\text{A}$
		$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$ , $T_J = 70\text{ }^{\circ}\text{C}$			-25	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} = -5\text{ V}$ , $V_{GS} = -4.5\text{ V}$	-20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = -4.5\text{ V}$ , $I_D = -8.0\text{ A}$		0.010		$\Omega$
		$V_{GS} = -2.5\text{ V}$ , $I_D = -7.0\text{ A}$		0.012		
		$V_{GS} = -1.8\text{ V}$ , $I_D = -5.8\text{ A}$		0.016		
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = -5\text{ V}$ , $I_D = -8.0\text{ A}$		44		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = -1.5\text{ A}$ , $V_{GS} = 0\text{ V}$		-0.56	-1.1	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = -10\text{ V}$ , $V_{GS} = -4.5\text{ V}$ , $I_D = -8.0\text{ A}$		46	70	nC
Gate-Source Charge	$Q_{gs}$			5		
Gate-Drain Charge	$Q_{gd}$			15.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -10\text{ V}$ , $R = 6\text{ }\Omega$ $I_D \cong -1\text{ A}$ , $V_{GEN} = -4.5\text{ V}$ , $R_g = 6\text{ }\Omega$		45	70	ns
Rise Time	$t_r$			85	130	
Turn-Off Delay Time	$t_{d(off)}$			220	400	
Fall Time	$t_f$			155	235	
Source-Drain Reverse Recovery Time	$t_{rr}$	$I_F = -1.5\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$		140	210	

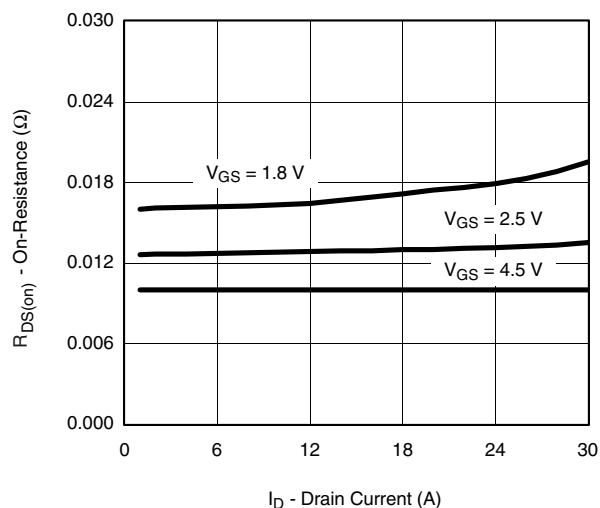
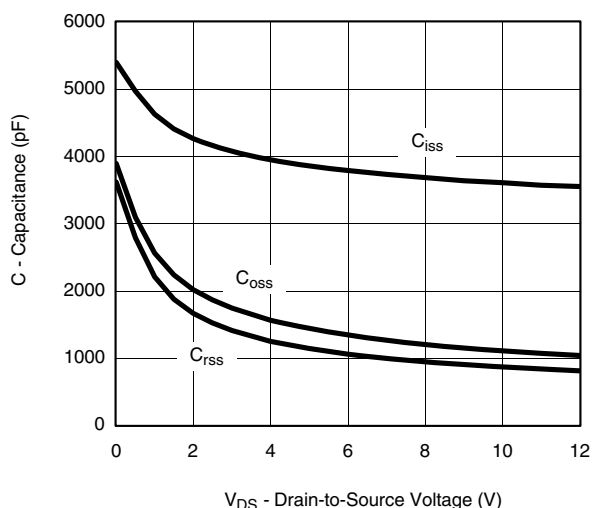
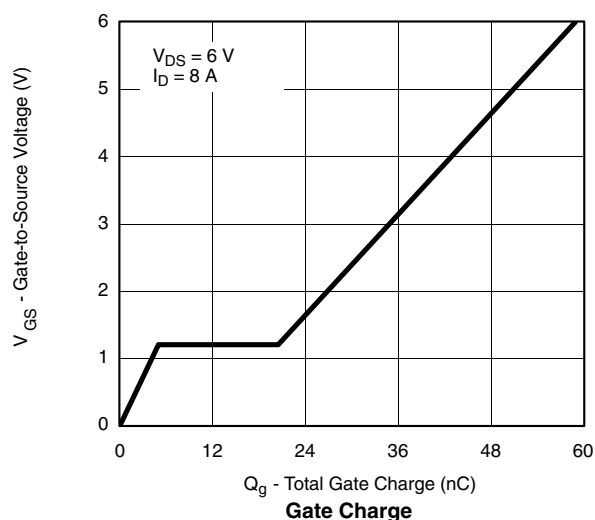
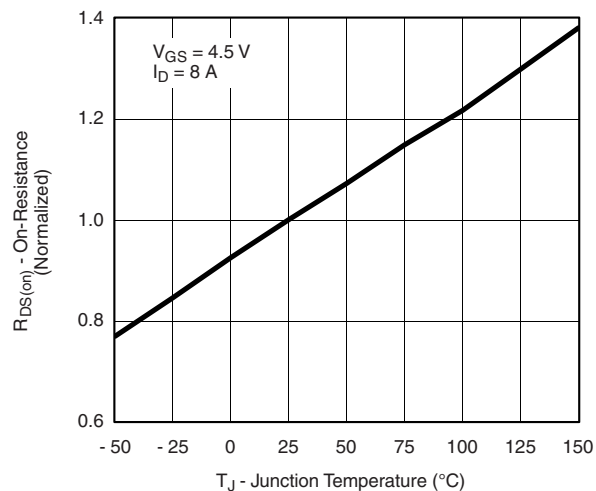
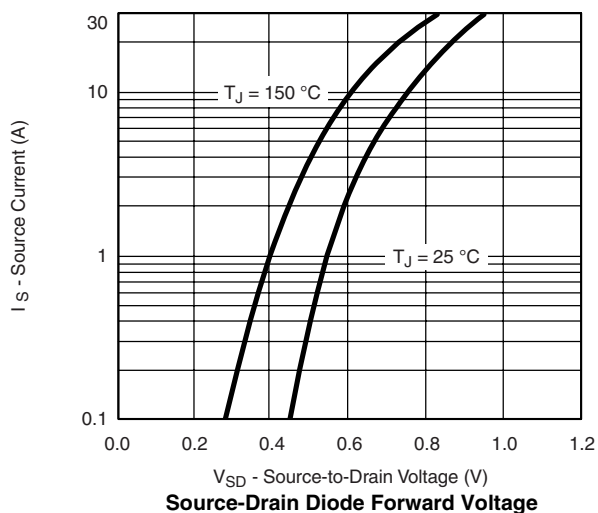
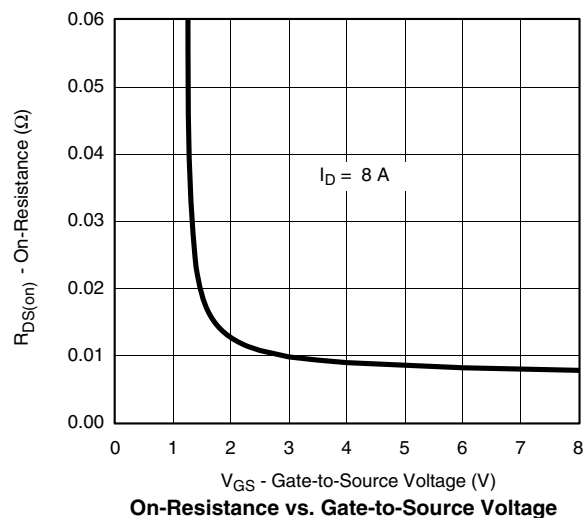
Notes:

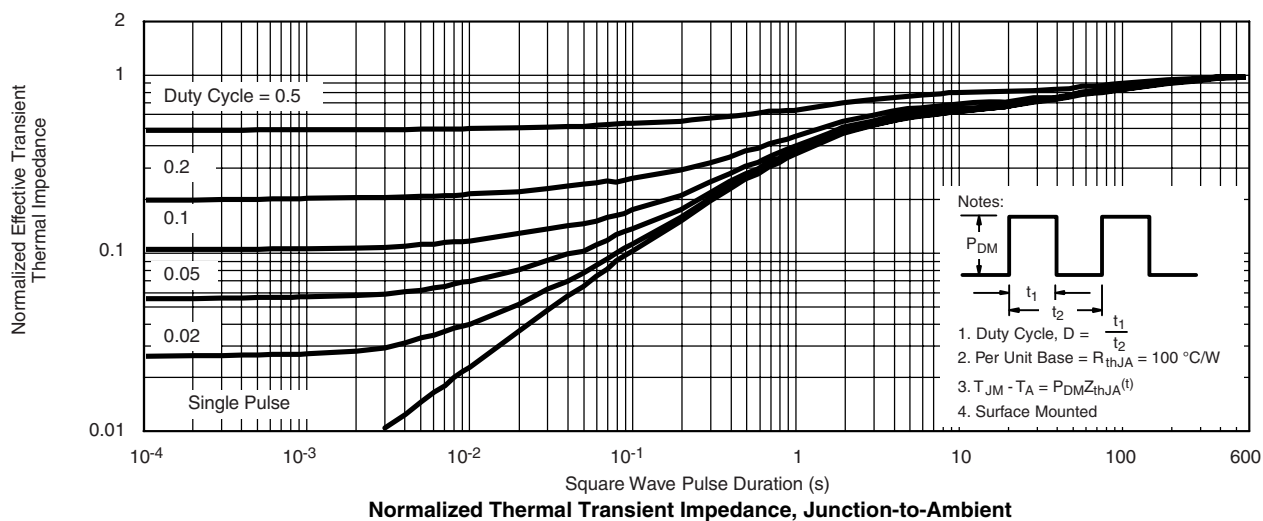
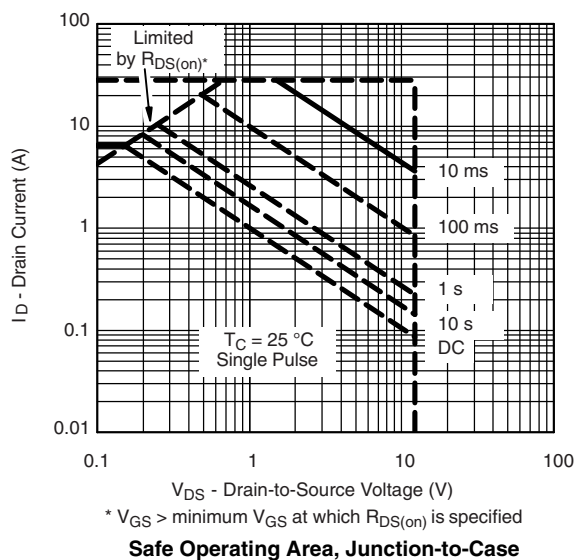
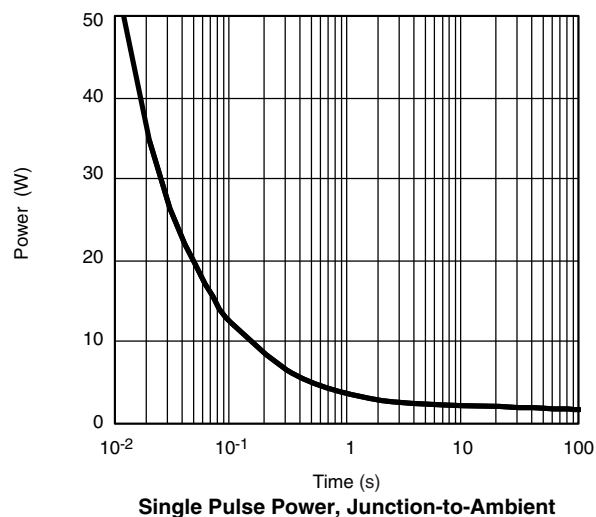
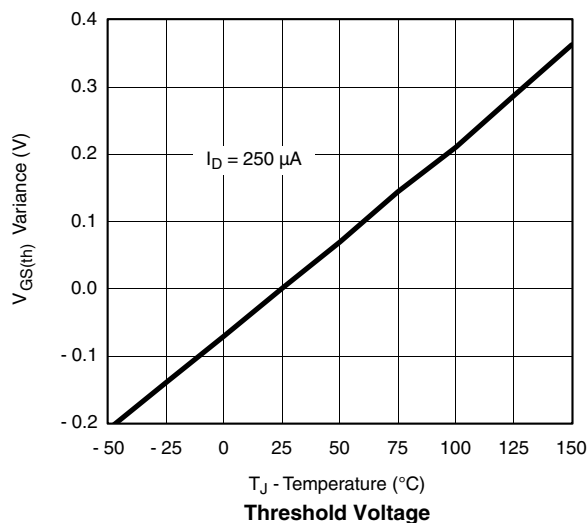
a. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .

b. Guaranteed by design, not subject to production testing.

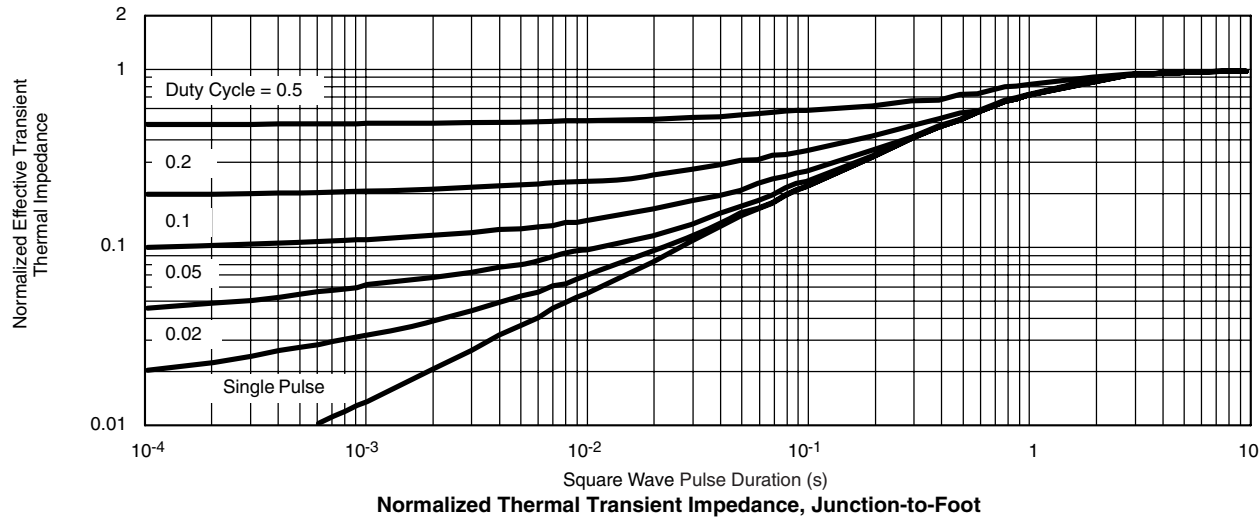
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS**  $25\text{ }^{\circ}\text{C}$ , unless otherwise noted

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**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**

**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted


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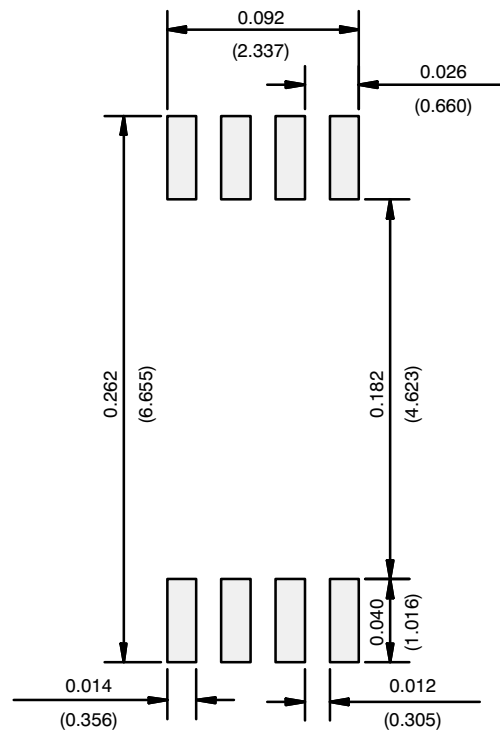


**TSSOP: 8-LEAD**  
JEDEC Part Number: MO-153



Dim	MILLIMETERS		
	Min	Nom	Max
A	—	—	1.20
A <sub>1</sub>	0.05	0.10	0.15
A <sub>2</sub>	0.80	1.00	1.05
B	0.19	0.28	0.30
C	—	0.127	—
D	2.90	3.00	3.10
E	6.20	6.40	6.60
E <sub>1</sub>	4.30	4.40	4.50
e	—	0.65	—
L	0.45	0.60	0.75
L <sub>1</sub>	0.90	1.00	1.10
Y	—	—	0.10
$\angle K1$	0°	3°	6°
ECN: S-03946—Rev. G, 09-Jul-01 DWG: 5844			

## RECOMMENDED MINIMUM PADS FOR TSSOP-8



Recommended Minimum Pads  
Dimensions in Inches/(mm)

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