

FW216A-VB Datasheet

Dual N-Channel 30 V (D-S) MOSFET

PRODUCT SUMMARY

V_{DS} (V)	$R_{DS(on)}$ (Ω)	I_D (A) ^a	Q_g (Typ.)
30	0.016 at $V_{GS} = 10$ V	8.5	7.1
	0.020 at $V_{GS} = 4.5$ V	7.6	

FEATURES

- Trench Power MOSFET
- 100 % R_g Tested
- 100 % UIS Tested
- Compliant to RoHS Directive 2002/95/EC


RoHS
 COMPLIANT

APPLICATIONS

- Notebook System Power
- Low Current DC/DC



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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	
Continuous Drain Current ($T_J = 150^\circ\text{C}$)	I_D	8.5	A
		7.5	
		7.2 ^{b, c}	
		5.9 ^{b, c}	
Pulsed Drain Current	I_{DM}	30	
Source-Drain Current Diode Current	I_S	2.8	
		1.8 ^{b, c}	
Pulsed Source-Drain Current	I_{SM}	30	
Single Pulse Avalanche Current	I_{AS}	10	
Single Pulse Avalanche Energy	E_{AS}	5	
Maximum Power Dissipation	P_D	3.1	W
		2.0	
		2.0 ^{b, c}	
		1.25 ^{b, c}	
Operating Junction and Storage Temperature Range	T_J, T_{stg}	- 55 to 150	$^\circ\text{C}$

THERMAL RESISTANCE RATINGS

Parameter		Symbol	Typ.	Max.	Unit
Maximum Junction-to-Ambient ^{b, d}	$t \leq 10$ s	R_{thJA}	52	62.5	$^\circ\text{C/W}$
Maximum Junction-to-Foot (Drain)	Steady-State	R_{thJF}	30	40	

Notes:

 a. Based on $T_C = 25^\circ\text{C}$.

b. Surface mounted on 1" x 1" FR4 board.

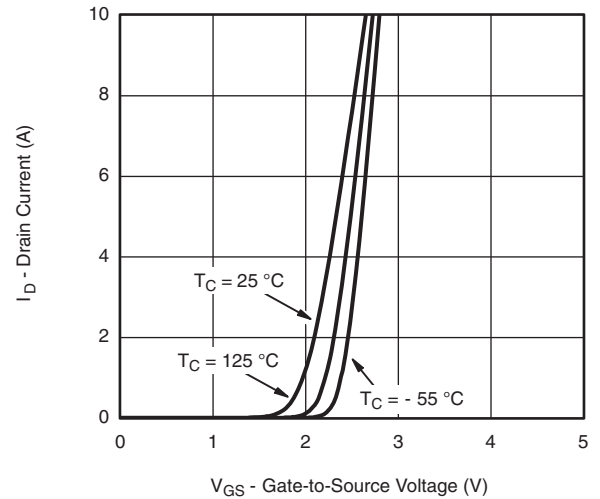
 c. $t = 10$ s.

 d. Maximum under steady state conditions is 110°C/W .

SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	30			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		3.0		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J	I _D = 250 μA		- 5.2		
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.2		2.5	V
Gate-Body Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 20 V			100	nA
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 30 V, V _{GS} = 0 V			1	μA
		V _{DS} = 30 V, V _{GS} = 0 V, T _J = 55 °C			10	
On -State Drain Current ^b	I _{D(on)}	V _{DS} = 5 V, V _{GS} = 10 V	20			A
Drain-Source On-State Resistance ^b	R _{DS(on)}	V _{GS} = 10 V, I _D = 8 A		0.016		Ω
		V _{GS} = 4.5 V, I _D = 5 A		0.020		
Forward Transconductance ^b	g _{fs}	V _{DS} = 15 V, I _D = 8 A		27		S
Dynamic ^a						
Input Capacitance	C _{iss}	V _{DS} = 15 V, V _{GS} = 0 V, I _D = 1 MHz		660		pF
Output Capacitance	C _{oss}			140		
Reverse Transfer Capacitance	C _{rss}			86		
Total Gate Charge	Q _g	V _{DS} = 15 V, V _{GS} = 10 V, I _D = 8 A		14.5	22	nC
		V _{DS} = 15 V, V _{GS} = 4.5 V, I _D = 8 A		7.1	11	
Gate-Source Charge	Q _{gs}			1.9		
Gate-Drain Charge	Q _{gd}			2.7		
Gate Resistance	R _g	f = 1 MHz	0.5	2.6	5.2	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 3 Ω I _D ≅ 5 A, V _{GEN} = 4.5 V, R _g = 1 Ω		14	28	ns
Rise Time	t _r			45	80	
Turn-Off Delay Time	t _{d(off)}			18	35	
Fall Time	t _f			12	24	
Turn-On Delay Time	t _{d(on)}	V _{DD} = 15 V, R _L = 3 Ω I _D ≅ 5 A, V _{GEN} = 10 V, R _g = 1 Ω		7	14	
Rise Time	t _r			10	20	
Turn-Off Delay Time	t _{d(off)}			15	30	
Fall Time	t _f			7	14	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C			2.8	A
Pulse Diode Forward Current ^a	I _{SM}				30	
Body Diode Voltage	V _{SD}	I _S = 2 A		0.77	1.1	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 5 A, dI/dt = 100 A/μs, T _J = 25 °C		17	34	ns
Body Diode Reverse Recovery Charge	Q _{rr}			9	18	nC
Reverse Recovery Fall Time	t _a			10		nS
Reverse Recovery Rise Time	t _b			7		

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 °C, unless otherwise noted)

Output Characteristics

Transfer Characteristics

On-Resistance vs. Drain Current and Gate Voltage

Capacitance

Gate Charge

On-Resistance vs. Junction Temperature

A semi-logarithmic plot showing the source-drain current I_S (in Amperes, A) on the y-axis versus the source-to-drain voltage V_{SD} (in Volts, V) on the x-axis. The y-axis is logarithmic, ranging from 0.001 to 100 A. The x-axis is linear, ranging from 0.0 to 1.2 V. Two curves are plotted: one for $T_J = 150\text{ }^{\circ}\text{C}$ (upper curve) and one for $T_J = 25\text{ }^{\circ}\text{C}$ (lower curve). Both curves show an increase in current with increasing voltage, with the current being significantly higher at $150\text{ }^{\circ}\text{C}$ than at $25\text{ }^{\circ}\text{C}$ for the same voltage.

V_{SD} (V)	I_S (A) at $T_J = 150\text{ }^{\circ}\text{C}$	I_S (A) at $T_J = 25\text{ }^{\circ}\text{C}$
0.25	0.001	-
0.40	0.05	-
0.50	0.2	0.001
0.60	1.0	0.01
0.80	10	1.0
1.00	30	10
1.20	50	30

Graph showing On-Resistance ($R_{DS(on)}$) versus Gate-to-Source Voltage (V_{GS}) for the 2N7000 MOSFET at $I_D = 8\text{ A}$. The curves are plotted for two junction temperatures: $T_J = 125\text{ }^{\circ}\text{C}$ and $T_J = 25\text{ }^{\circ}\text{C}$. The on-resistance decreases sharply as V_{GS} increases from 2.5 V to 3.5 V and then levels off. The 25 °C curve is lower than the 125 °C curve.

Figure 10 is a line graph showing the variation of threshold voltage $V_{GS(th)}$ with temperature T_J . The y-axis represents $V_{GS(th)}$ in Volts (V), ranging from -1.0 to 0.5. The x-axis represents T_J - Temperature in degrees Celsius ($^{\circ}C$), ranging from -50 to 150. Two curves are plotted: a solid black line for $I_D = 5 \text{ mA}$ and a solid grey line for $I_D = 250 \mu\text{A}$. Both curves show a negative linear relationship between $V_{GS(th)}$ and temperature, with the $I_D = 5 \text{ mA}$ curve having a steeper negative slope.

A line graph showing the power consumption of a 100 W light bulb over time. The vertical axis is labeled 'Power (W)' and ranges from 0 to 50 in increments of 10. The horizontal axis is labeled 'Time (s)' and is on a logarithmic scale with major ticks at 0.001, 0.01, 0.1, 1, and 10. A single curve starts at 50 W at 0.001 s and decreases as time increases, passing through approximately 32 W at 0.005 s, 20 W at 0.01 s, 10 W at 0.1 s, and leveling off towards 2 W at 10 s.

Figure 10 is a graph showing Drain Current (I_D) versus Drain-to-Source Voltage (V_{DS}) for various pulse widths. The Y-axis is I_D - Drain Current (A) on a logarithmic scale from 0.01 to 100. The X-axis is V_{DS} - Drain-to-Source Voltage (V) on a logarithmic scale from 0.01 to 100. The graph shows a solid line for DC and dashed lines for pulse widths of 1 ms, 10 ms, 100 ms, 1 s, 10 s, and DC. The graph is limited by $R_{DS(on)}^*$ for $V_{DS} < 1$ V and BVDSS Limited for $V_{DS} > 1$ V. The temperature is $T_A = 25^\circ\text{C}$ and the pulse is a single pulse.

Safe Operating Area, Junction-to-Ambient

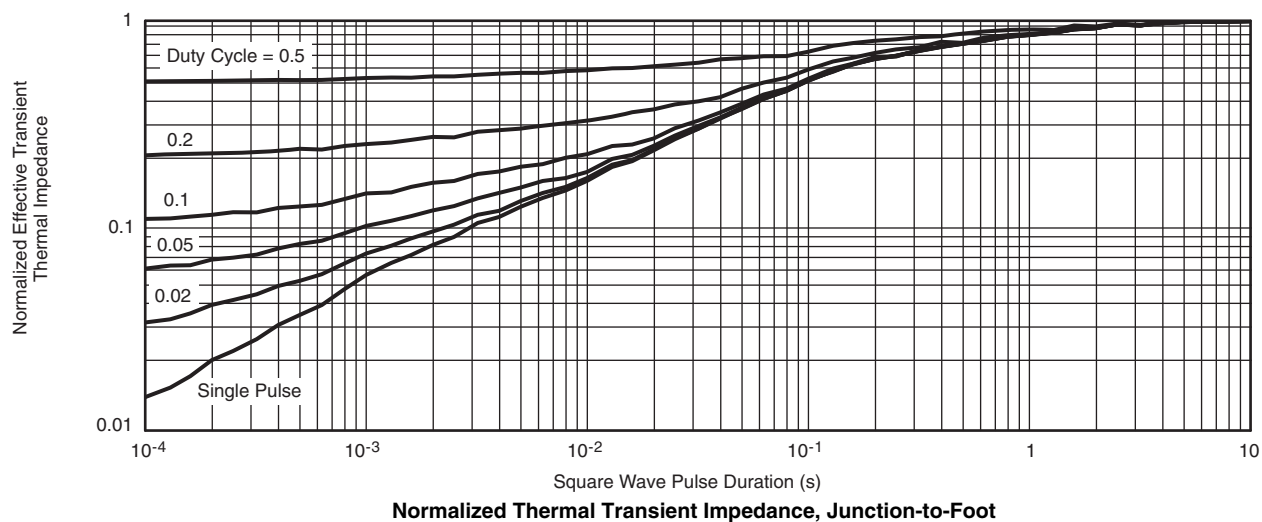
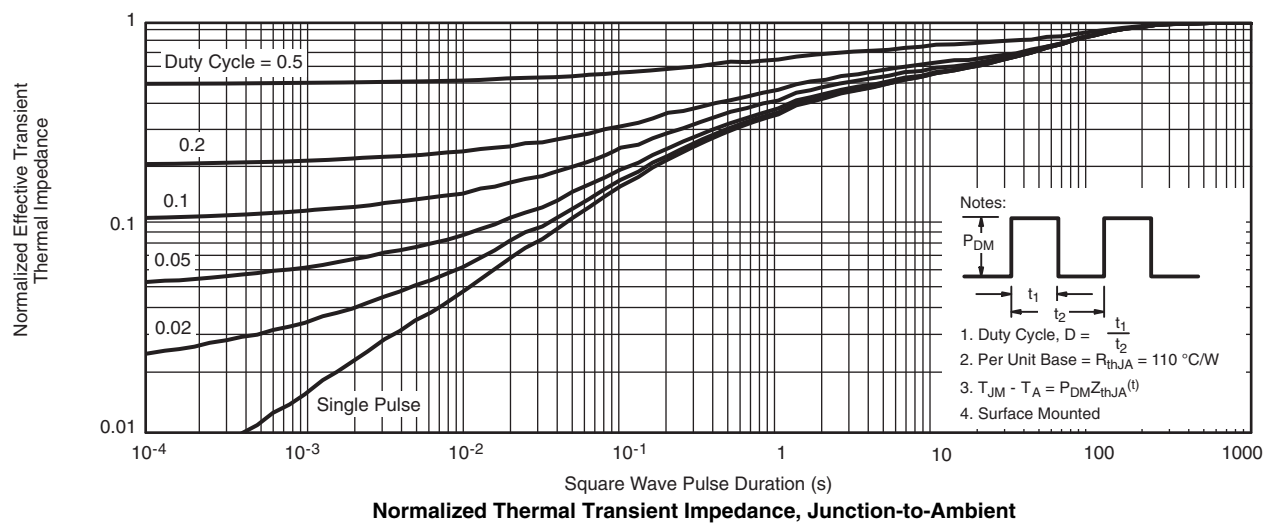
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Current Derating*

Power Derating, Junction-to-Foot

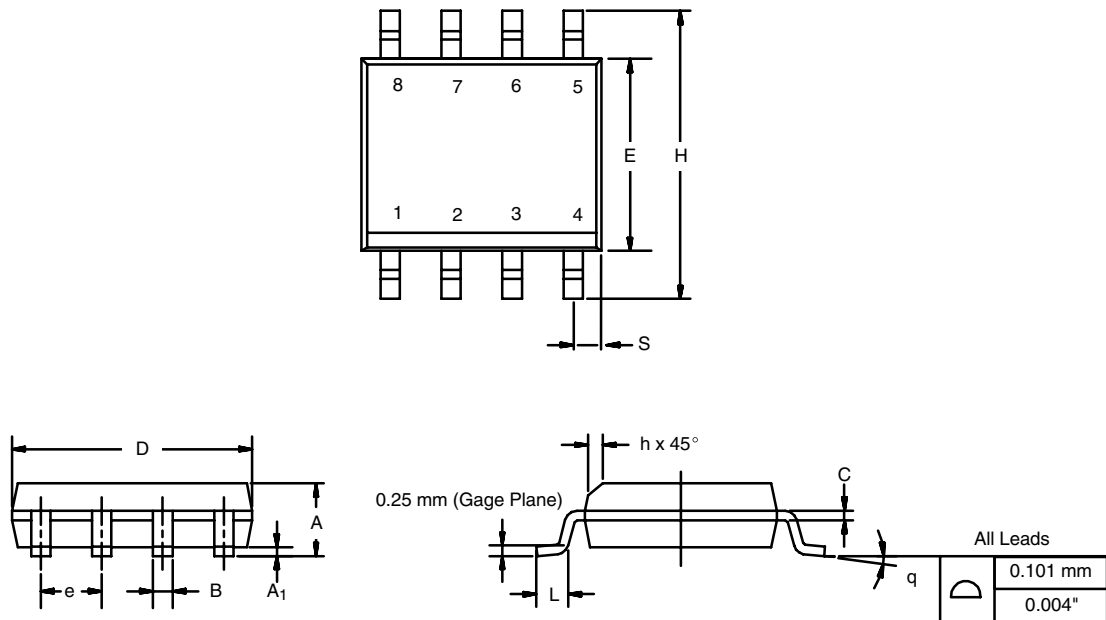
Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150$ °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)


SOIC (NARROW): 8-LEAD

JEDEC Part Number: MS-012



DIM	MILLIMETERS		INCHES	
	Min	Max	Min	Max
A	1.35	1.75	0.053	0.069
A ₁	0.10	0.20	0.004	0.008
B	0.35	0.51	0.014	0.020
C	0.19	0.25	0.0075	0.010
D	4.80	5.00	0.189	0.196
E	3.80	4.00	0.150	0.157
e	1.27 BSC		0.050 BSC	
H	5.80	6.20	0.228	0.244
h	0.25	0.50	0.010	0.020
L	0.50	0.93	0.020	0.037
q	0°	8°	0°	8°
S	0.44	0.64	0.018	0.026
ECN: C-06527-Rev. I, 11-Sep-06				
DWG: 5498				

RECOMMENDED MINIMUM PADS FOR SO-8



Recommended Minimum Pads
Dimensions in Inches/(mm)

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