NTTFS5116PL

MOSFET – Power

-60 V, -20 A, 52 mΩ

ON Semiconductor®

www.onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
−60 V	52 mΩ @ −10 V	−20 A
	72 mΩ @ −4.5 V	

Features

- Low $R_{DS(on)}$
- Fast Switching
- These Devices are Pb−Free and are RoHS Compliant

Applications

- Load Switches
- DC Motor Control
- DC−DC Conversion

MAXIMUM RATINGS (T_J = 25°C unless otherwise stated)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	−60	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current $R_{\theta JA}$ (Note 1)	Steady State	T_A = 25°C	I_D	−5.7	A
		T_A = 100°C		−4.0	
Power Dissipation $R_{\theta JA}$ (Note 1)		T_A = 25°C	P_D	3.2	W
		T_A = 100°C		1.6	
Continuous Drain Current $R_{\theta JC}$ (Note 1)		T_C = 25°C	I_D	−20	A
		T_C = 100°C		−14	
Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	P_D	40	W
		T_C = 100°C		20	
Pulsed Drain Current	t_p = 10 µs		I_{DM}	−76	A
Operating Junction and Storage Temperature			T_J, T_{stg}	−55 to +175	°C
Source Current (Body Diode)			I_S	−20	A
Single Pulse Drain−to−Source Avalanche Energy		L = 0.1 mH	E_{AS}	45	mJ
			I_{AS}	30	A
Lead Temperature for Soldering Purposes (1/8” from case for 10 s)			T_L	260	°C

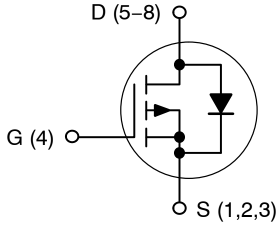
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

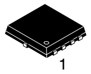
THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction−to−Case – Steady State (Note 1)	$R_{\theta JC}$	3.8	°C/W
Junction−to−Ambient – Steady State (Note 1)	$R_{\theta JA}$	47	

1. Surface−mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces.

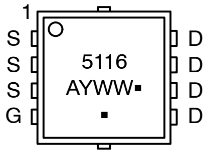
P−Channel MOSFET





WDFN8
(µ8FL)
CASE 511AB

MARKING DIAGRAM



5116 = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTTFS5116PLTAG	WDFN8 (Pb−Free)	1500/Tape & Reel
NTTFS5116PLTWG	WDFN8 (Pb−Free)	5000/Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = −250 μA		−60			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				69.7		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = −60 V	T_J = 25°C			−1.0	μA
			T_J = 125°C			−100	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 μA		−1		−3	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−6.2		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = −10 V	I_D = −6 A		37	52	mΩ
		V_{GS} = −4.5 V	I_D = −4.4 A		51	72	
Forward Transconductance	g_{FS}	V_{DS} = −15 V, I_D = −6 A			11		S
CHARGES, CAPACITANCES AND GATE RESISTANCE							
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −30 V			1258		pF
Output Capacitance	C_{oss}				127		
Reverse Transfer Capacitance	C_{rss}				84		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −10 V, V_{DS} = −48 V, I_D = −5 A			25		nC
		V_{GS} = −4.5 V, V_{DS} = −48 V, I_D = −5 A			14		
Threshold Gate Charge	$Q_{G(TH)}$	V_{GS} = −4.5 V, V_{DS} = −48 V, I_D = −5 A			1		nC
Gate−to−Source Charge	Q_{GS}				4		
Gate−to−Drain Charge	Q_{GD}				7		
Plateau Voltage	V_{GP}				3.1		V
Gate Resistance	R_G				5.3		Ω
SWITCHING CHARACTERISTICS (Note 3)							
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = −4.5 V, V_{DS} = −48 V, I_D = −5 A, R_G = 6 Ω			15		ns
Rise Time	t_r				58		
Turn−Off Delay Time	$t_{d(off)}$				30		
Fall Time	t_f				37		
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = −5 A	T_J = 25°C		−0.79	−1.2	V
			T_J = 125°C		−0.64		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, d_{IS}/d_t = −100 A/μs, I_S = −5 A			20		ns
Charge Time	t_a				15		
Discharge Time	t_b				5		
Reverse Recovery Charge	Q_{RR}				19		nC

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

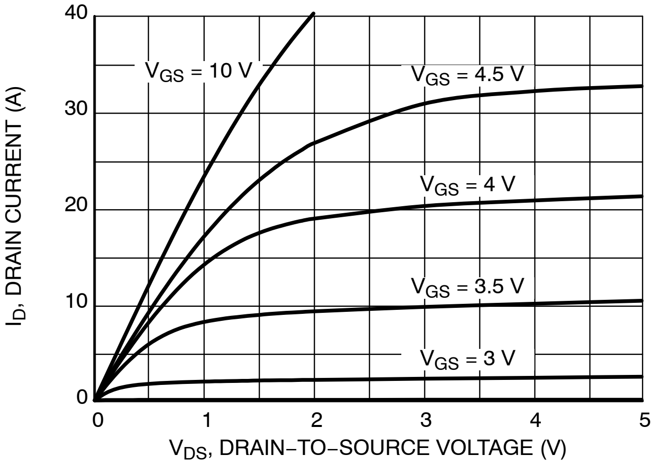


Figure 1. On−Region Characteristics

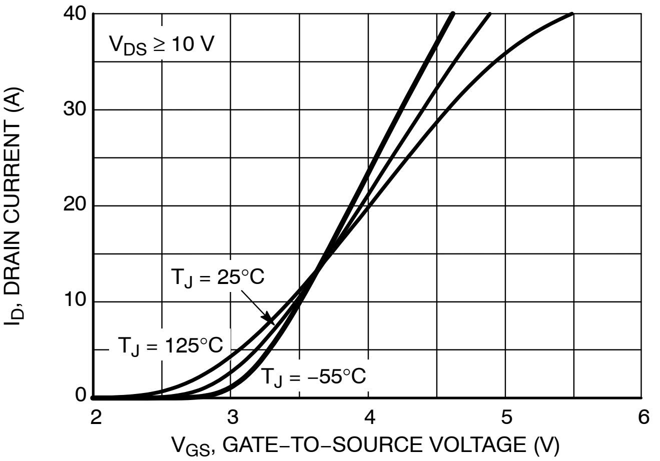


Figure 2. Transfer Characteristics

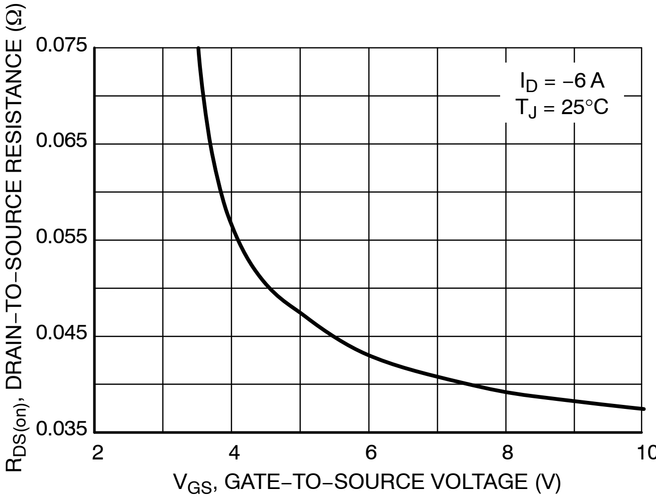


Figure 3. On−Resistance vs. Gate−to−Source Voltage

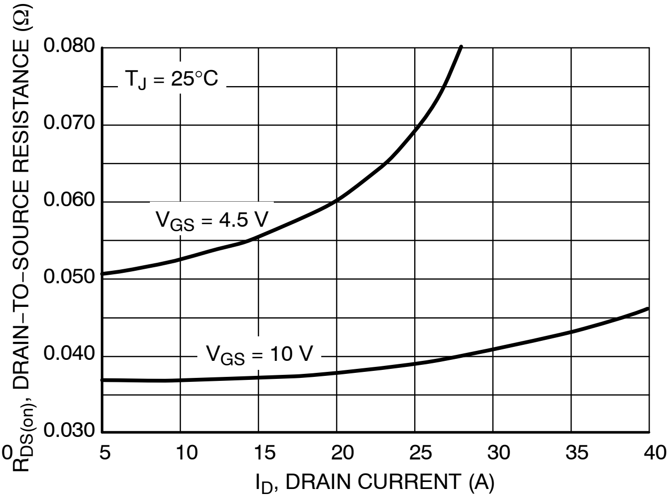


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

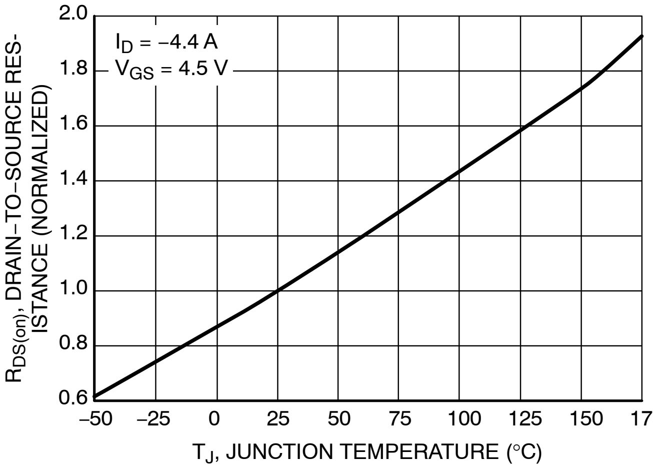


Figure 5. On−Resistance Variation with Temperature

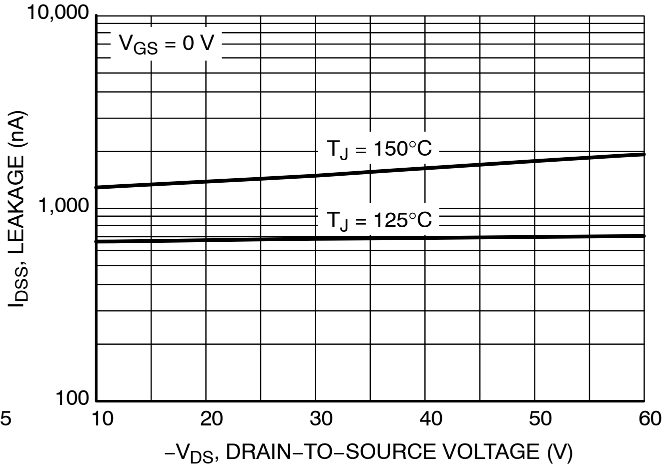


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS

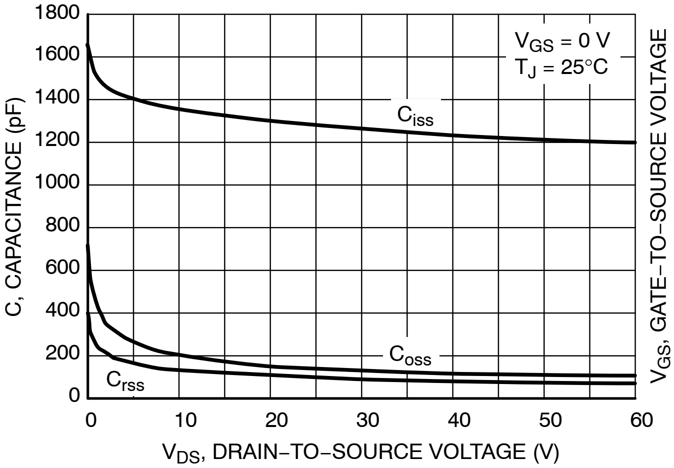


Figure 7. Capacitance Variation

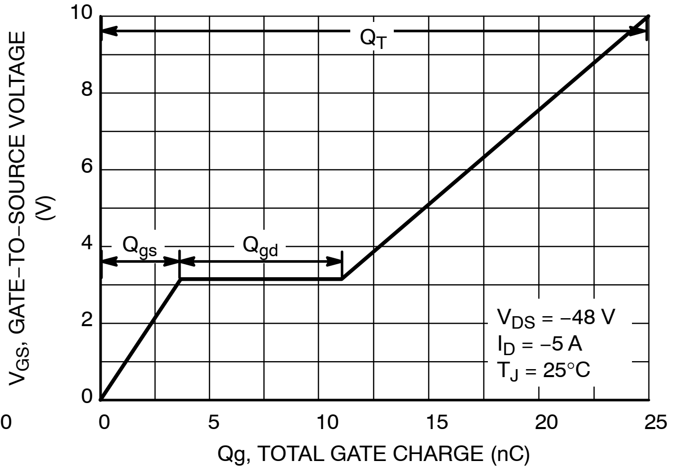


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

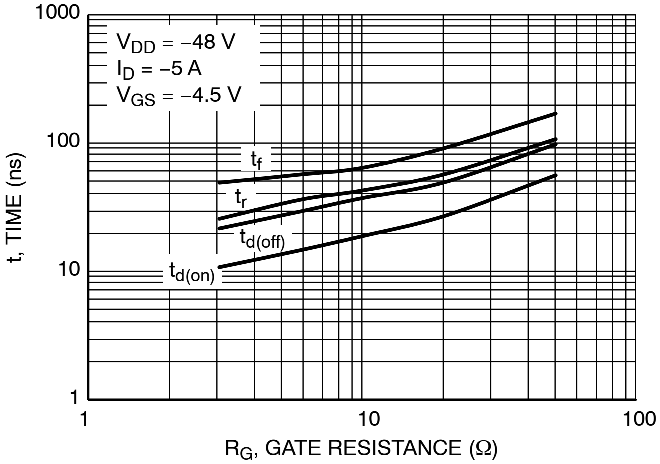


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

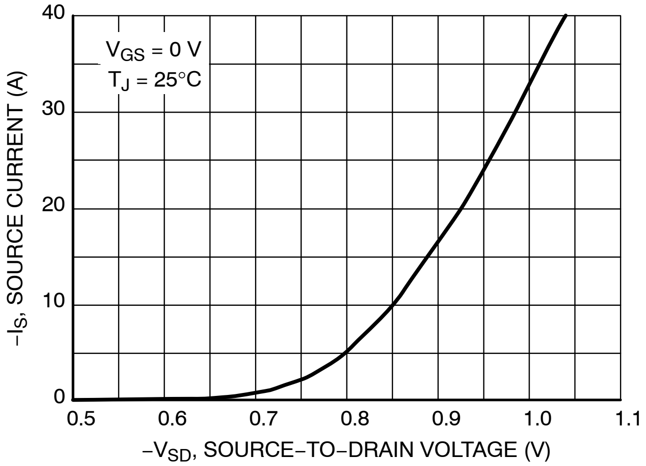


Figure 10. Diode Forward Voltage vs. Current

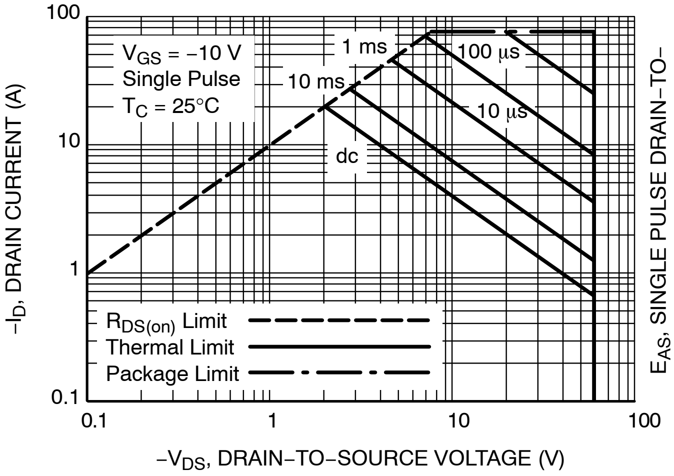


Figure 11. Maximum Rated Forward Biased Safe Operating Area

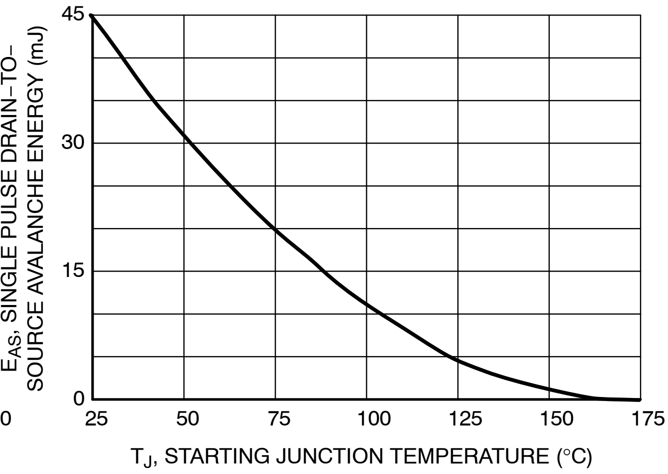


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL CHARACTERISTICS

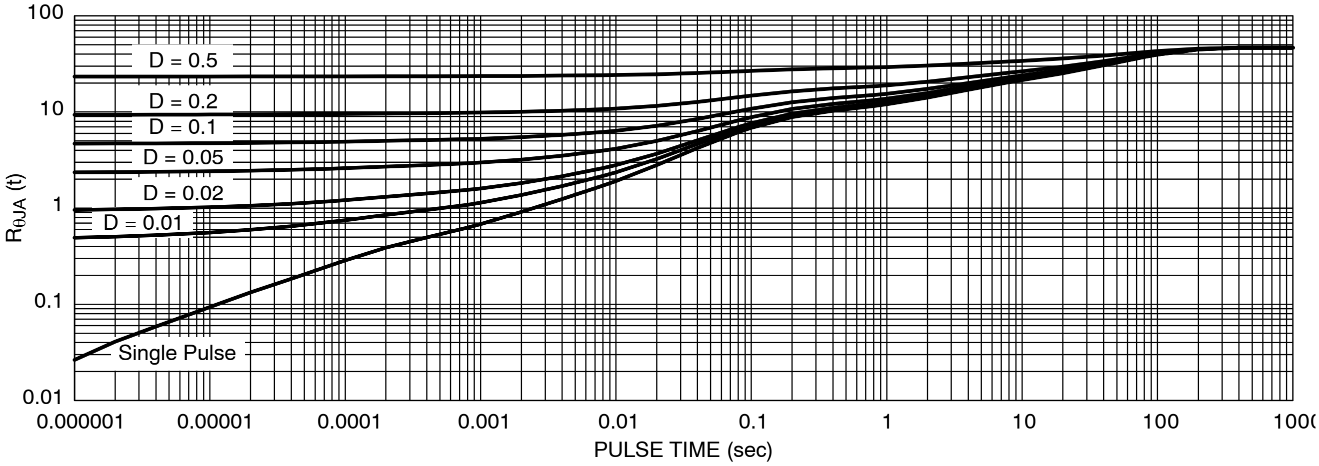
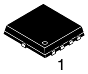


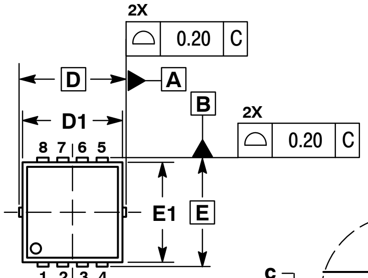
Figure 13. Thermal Response



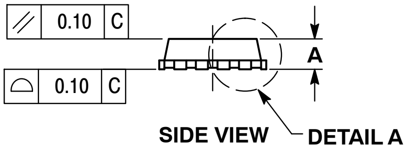
SCALE 2:1

WDFN8 3.3x3.3, 0.65P
CASE 511AB
ISSUE D

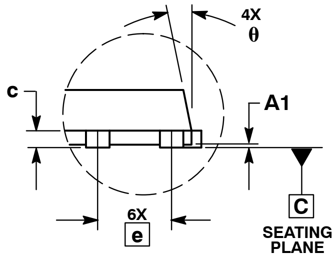
DATE 23 APR 2012



TOP VIEW



SIDE VIEW

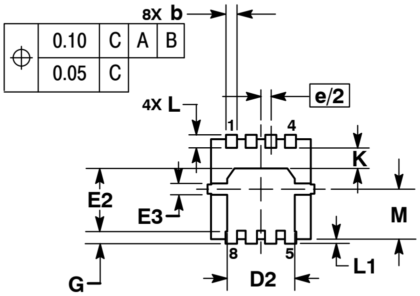


DETAIL A

NOTES:

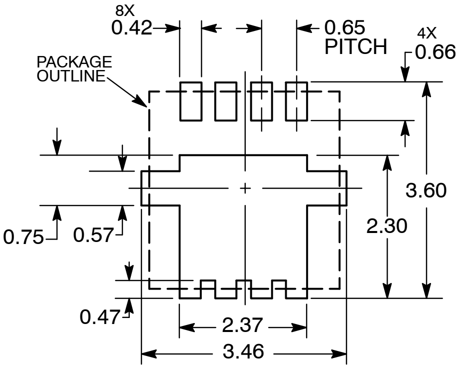
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION D1 AND E1 DO NOT INCLUDE MOLD FLASH PROTRUSIONS OR GATE BURRS.

	MILLIMETERS			INCHES		
DIM	**MIN**	**NOM**	**MAX**	**MIN**	**NOM**	**MAX**
A	0.70	0.75	0.80	0.028	0.030	0.031
A1	0.00	---	0.05	0.000	---	0.002
b	0.23	0.30	0.40	0.009	0.012	0.016
c	0.15	0.20	0.25	0.006	0.008	0.010
D		3.30 BSC			0.130 BSC	
D1	2.95	3.05	3.15	0.116	0.120	0.124
D2	1.98	2.11	2.24	0.078	0.083	0.088
E		3.30 BSC			0.130 BSC	
E1	2.95	3.05	3.15	0.116	0.120	0.124
E2	1.47	1.60	1.73	0.058	0.063	0.068
E3	0.23	0.30	0.40	0.009	0.012	0.016
e		0.65 BSC			0.026 BSC	
G	0.30	0.41	0.51	0.012	0.016	0.020
K	0.65	0.80	0.95	0.026	0.032	0.037
L	0.30	0.43	0.56	0.012	0.017	0.022
L1	0.06	0.13	0.20	0.002	0.005	0.008
M	1.40	1.50	1.60	0.055	0.059	0.063
θ	0 °	---	12 °	0 °	---	12 °



BOTTOM VIEW

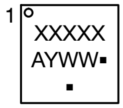
SOLDERING FOOTPRINT*



DIMENSION: MILLIMETERS

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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DESCRIPTION:	**WDFN8 3.3X3.3, 0.65P**	**PAGE 1 OF 1**

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