MOSFET – Power, Single N-Channel

60 V, 50 A, 9.3 mΩ

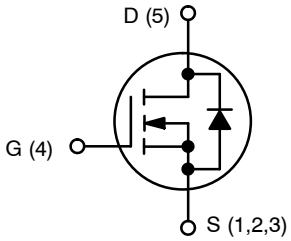
NTTFS5CS73NL

$V_{(BR)DSS}$	$R_{DS(ON)}$ MAX	I_D MAX
60 V	9.3 mΩ @ 10 V	50 A
	13.3 mΩ @ 4.5 V	

Features

- Small Footprint (3.3x3.3 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

N−CHANNEL MOSFET



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

Symbol	Parameter			Value	Unit
V_{DSS}	Drain−to−Source Voltage			60	V
V_{GS}	Gate−to−Source Voltage			±20	V
I_D	Continuous Drain Current $R_{\theta JC}$ (Notes 1, 3)	Steady State	T_C = 25°C	50	A
			T_C = 100°C	35	
P_D	Power Dissipation $R_{\theta JC}$ (Note 1)		T_C = 25°C	46	W
			T_C = 100°C	23	
I_D	Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	T_A = 25°C	13	A
			T_A = 100°C	9	
P_D	Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)		T_A = 25°C	3.1	W
			T_A = 100°C	1.6	
I_{DM}	Pulsed Drain Current	T_A = 25°C, t_p = 10 μs		290	A
T_J, T_{stg}	Operating Junction and Storage Temperature			−55 to +175	°C
I_S	Source Current (Body Diode)			52	A
E_{AS}	Single Pulse Drain−to−Source Avalanche Energy ($I_{L(pk)}$ = 2.3 A)			88	mJ
T_L	Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			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.

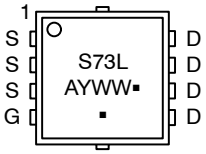
THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction−to−Case − Steady State	3.2	°C/W
$R_{\theta JA}$	Junction−to−Ambient − Steady State (Note 2)	48	

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface−mounted on FR4 board using a 650 mm^2, 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.

MARKING DIAGRAM

WDFN8
(μ8FL)
CASE 511AB



S73L = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering, marking and shipping information in the package dimensions section on page 5 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 5.

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

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
$V_{(BR)DSS}$	Drain−to−Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA		60			V
$V_{(BR)DSS}/T_J$	Drain−to−Source Breakdown Voltage Temperature Coefficient				28		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25°C			10	μA
			T_J = 125°C			250	
I_{GSS}	Gate−to−Source Leakage Current	V_{DS} = 0 V, V_{GS} = 20 V				100	nA
ON CHARACTERISTICS (Note 4)							
$V_{GS(TH)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 35 μA		1.2		2.0	V
$V_{GS(TH)}/T_J$	Threshold Temperature Coefficient				−4.5		mV/°C
$R_{DS(on)}$	Drain−to−Source On Resistance	V_{GS} = 10 V	I_D = 25 A		8.0	9.3	mΩ
		V_{GS} = 4.5 V	I_D = 25 A		11	13.3	
g_{FS}	Forward Transconductance	V_{DS} =15 V, I_D = 25 A			37		S
CHARGES AND CAPACITANCES							
C_{ISS}	Input Capacitance	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 25 V			880		pF
C_{OSS}	Output Capacitance				450		
C_{RSS}	Reverse Transfer Capacitance				11		
$Q_{G(TOT)}$	Total Gate Charge	V_{GS} = 4.5 V, V_{DS} = 30 V; I_D = 25 A			4.5		nC
$Q_{G(TOT)}$	Total Gate Charge	V_{GS} = 10 V, V_{DS} = 30 V; I_D = 25 A			9.5		nC
$Q_{G(TH)}$	Threshold Gate Charge	V_{GS} = 4.5 V, V_{DS} = 30 V; I_D = 25 A			1.0		nC
Q_{GS}	Gate−to−Source Charge				2.0		
Q_{GD}	Gate−to−Drain Charge				0.8		
V_{GP}	Plateau Voltage				2.9		V
SWITCHING CHARACTERISTICS (Note 5)							
$t_{d(ON)}$	Turn−On Delay Time	V_{GS} = 4.5 V, V_{DS} = 30 V, I_D = 25 A, R_G = 2.5 Ω			9.0		ns
t_r	Rise Time				50		
$t_{d(OFF)}$	Turn−Off Delay Time				13		
t_f	Fall Time				3.0		
DRAIN−SOURCE DIODE CHARACTERISTICS							
V_{SD}	Forward Diode Voltage	V_{GS} = 0 V, I_S = 25 A	T_J = 25°C		0.9	1.2	V
			T_J = 125°C		0.8		
t_{RR}	Reverse Recovery Time	V_{GS} = 0 V, dIs/dt = 100 A/μs, I_S = 25 A			28		ns
t_a	Charge Time				14		
t_b	Discharge Time				14		
Q_{RR}	Reverse Recovery Charge				18		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL CHARACTERISTICS

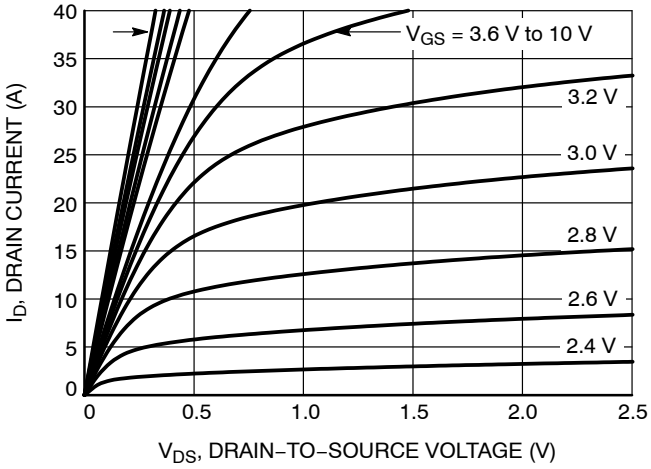


Figure 1. On−Region Characteristics

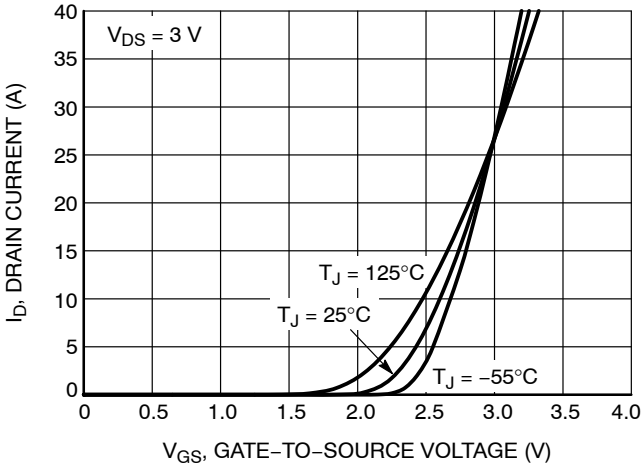


Figure 2. Transfer Characteristics

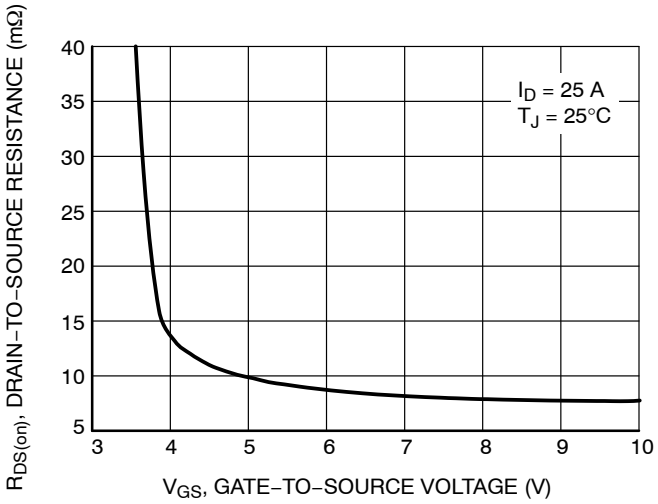


Figure 3. On−Resistance vs. Gate−to−Source Voltage

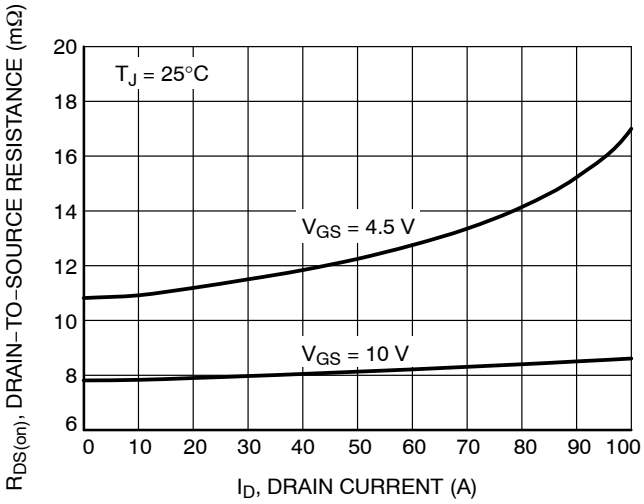


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

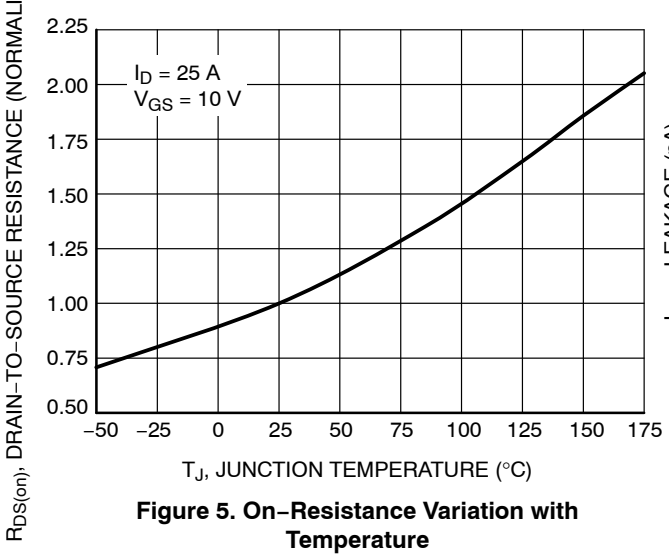


Figure 5. On−Resistance Variation with Temperature

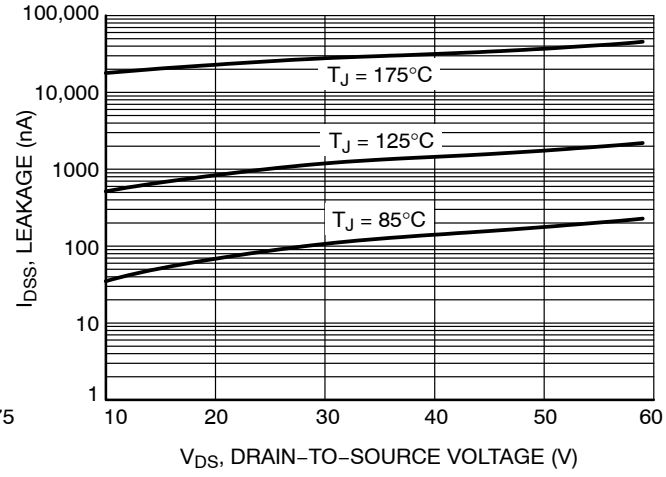


Figure 6. Drain−to−Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

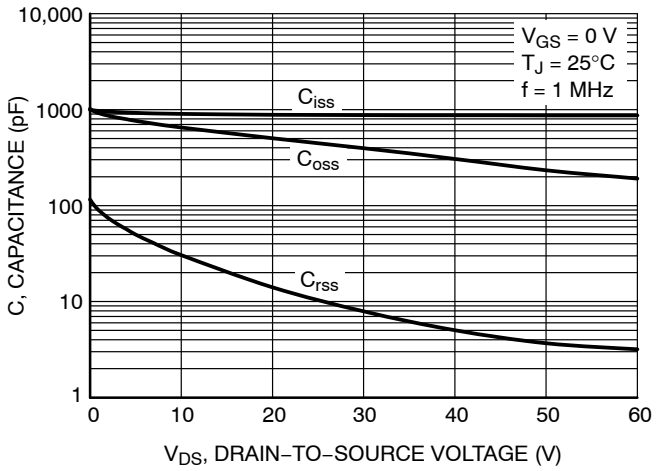


Figure 7. Capacitance Variation

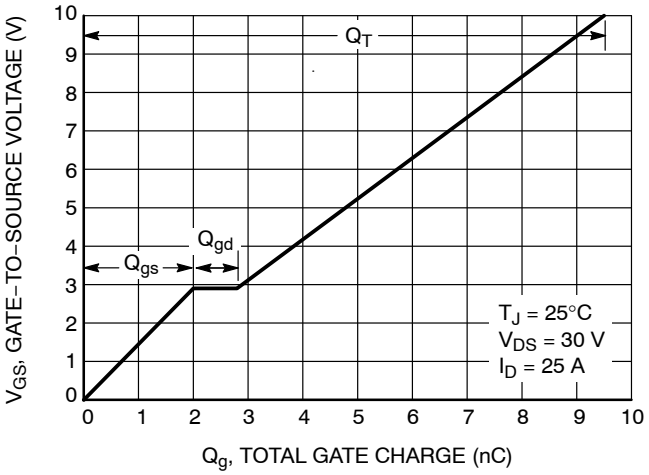


Figure 8. Gate−to−Source vs. Total Charge

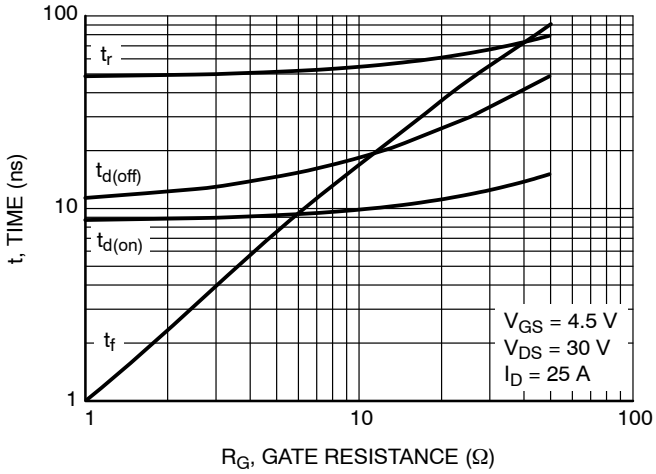


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

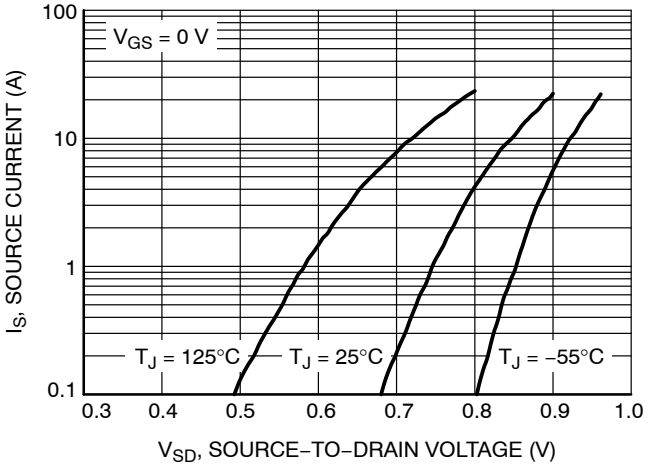


Figure 10. Diode Forward Voltage vs. Current

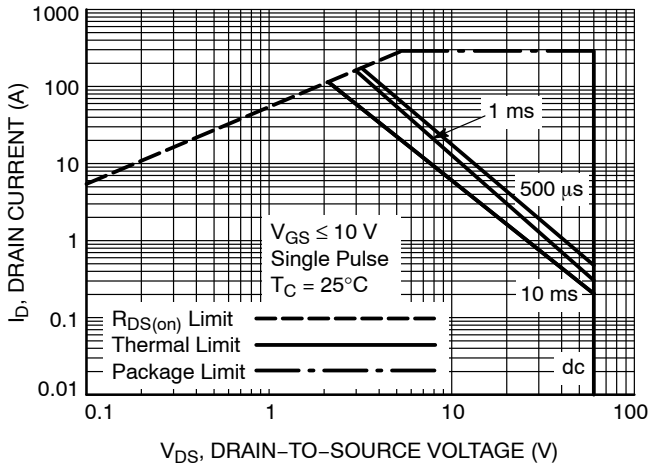


Figure 11. Maximum Rated Forward Biased Safe Operating Area

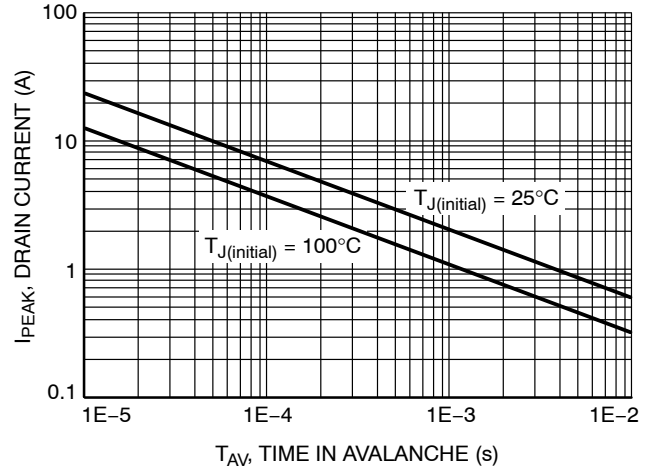


Figure 12. Maximum Drain Current vs. Time in Avalanche

TYPICAL CHARACTERISTICS (continued)

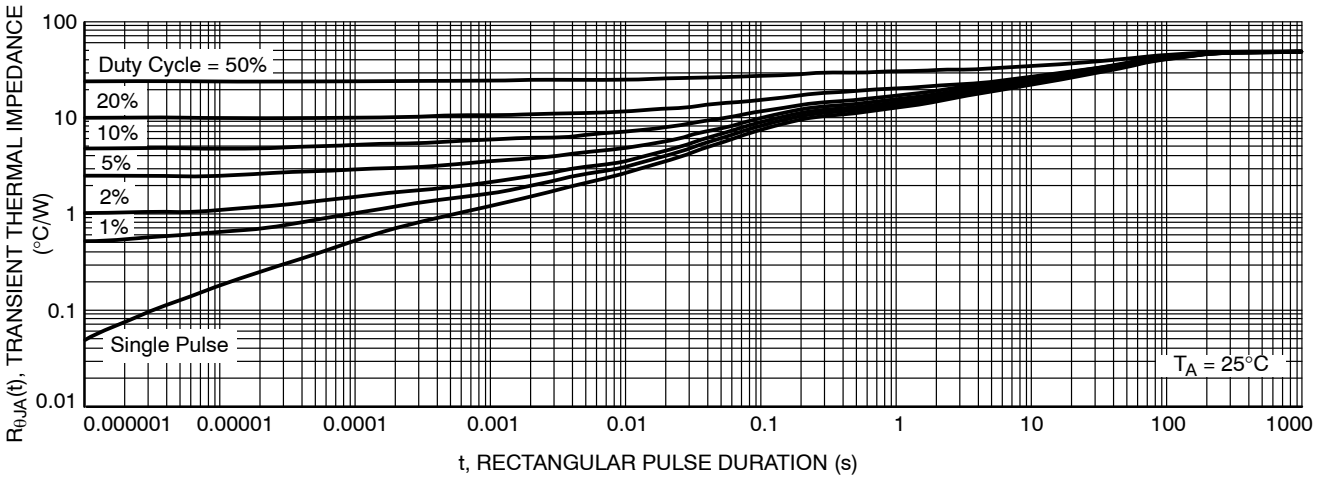


Figure 13. Thermal Response

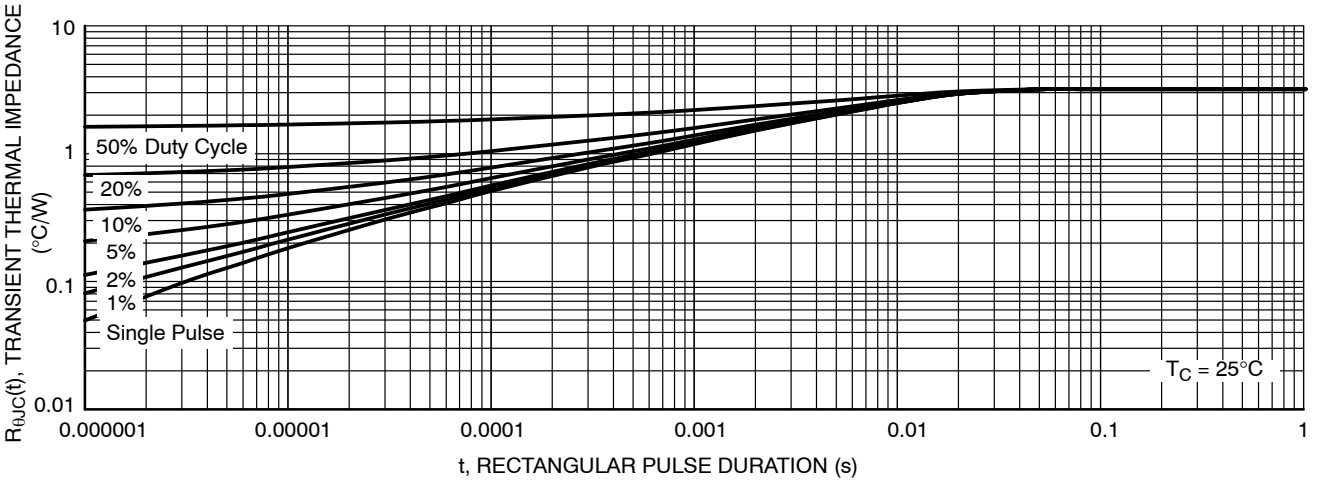


Figure 14. Thermal Response

DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping†
NTTFS5CS73NLTAG	S73L	DFN5 (Pb−Free)	1500 / Tape & Reel

DISCONTINUED (Note 6)

NTTFS5CS73NLTWG	S73L	DFN5 (Pb−Free)	5000 / Tape & Reel

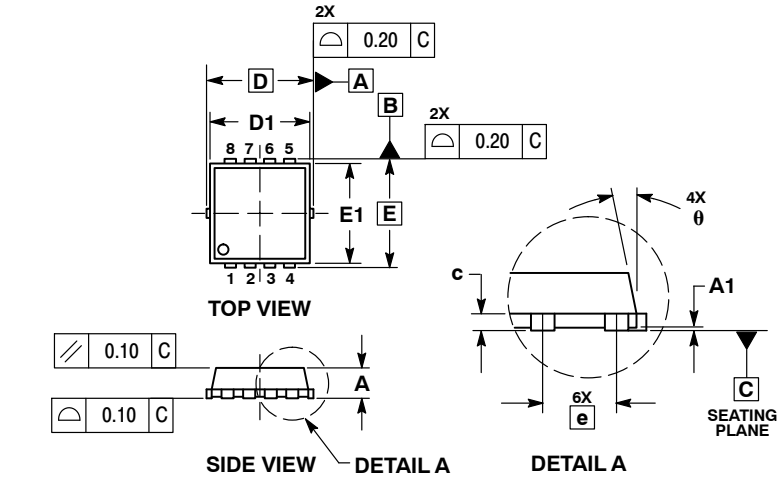
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

6. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

SCALE 2:1

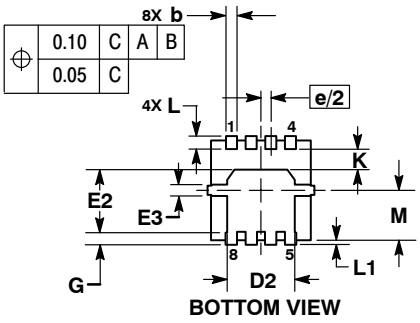
WDFN8 3.3x3.3, 0.65P
CASE 511AB
ISSUE D

DATE 23 APR 2012



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 °

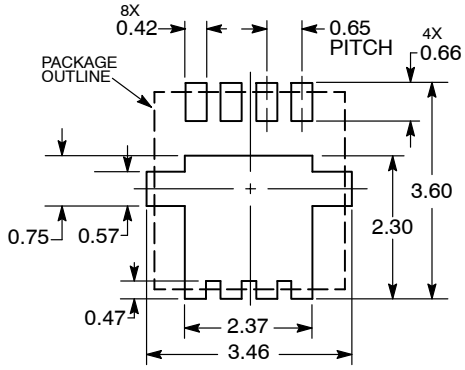


GENERIC MARKING DIAGRAM*

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.

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.

DOCUMENT NUMBER:	**98AON30561E**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	**WDFN8 3.3X3.3, 0.65P**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

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