

MOSFET – Power, Single N-Channel

60 V, 50 A, 9.3 mΩ

NTTFS5CS73NL

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

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

Symbol	Parameter			Value	Unit
V_{DS}	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	$T_C = 25^\circ\text{C}$	50	A
			$T_C = 100^\circ\text{C}$	35	
P_D	Power Dissipation $R_{\theta JC}$ (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	46	W
			$T_C = 100^\circ\text{C}$	23	
I_D	Continuous Drain Current $R_{\theta JA}$ (Notes 1, 2, 3)	Steady State	$T_A = 25^\circ\text{C}$	13	A
			$T_A = 100^\circ\text{C}$	9	
P_D	Power Dissipation $R_{\theta JA}$ (Notes 1 & 2)	Steady State	$T_A = 25^\circ\text{C}$	3.1	W
			$T_A = 100^\circ\text{C}$	1.6	
I_{DM}	Pulsed Drain Current	$T_A = 25^\circ\text{C}, t_p = 10 \mu\text{s}$	290	A	
T_J, T_{stg}	Operating Junction and Storage Temperature			-55 to +175	$^\circ\text{C}$
I_S	Source Current (Body Diode)			52	A
E_{AS}	Single Pulse Drain-to-Source Avalanche Energy ($I_{L(pk)} = 2.3 \text{ A}$)			88	mJ
T_L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	$^\circ\text{C}$

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.

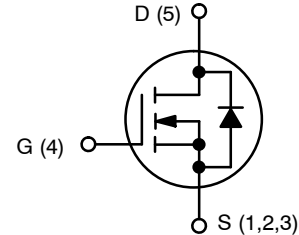
THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State	3.2	$^\circ\text{C/W}$
$R_{\theta JA}$	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 mm², 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.

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

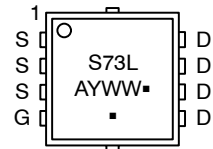
N-CHANNEL MOSFET



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.

NTTFS5CS73NL

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	60			V
$V_{(BR)DSS}/T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient			28		mV/ $^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		10	μA
			$T_J = 125^\circ\text{C}$		250	
I_{GSS}	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = 20\text{ V}$			100	nA

ON CHARACTERISTICS (Note 4)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 35\text{ }\mu\text{A}$	1.2		2.0	V
$V_{GS(TH)}/T_J$	Threshold Temperature Coefficient			-4.5		mV/ $^\circ\text{C}$
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = 10\text{ V}, I_D = 25\text{ A}$		8.0	9.3	m Ω
		$V_{GS} = 4.5\text{ V}, I_D = 25\text{ A}$		11	13.3	
g_{FS}	Forward Transconductance	$V_{DS} = 15\text{ V}, I_D = 25\text{ A}$		37		S

CHARGES AND CAPACITANCES

C_{ISS}	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1\text{ MHz}, V_{DS} = 25\text{ V}$		880		pF
C_{OSS}	Output Capacitance			450		
C_{RSS}	Reverse Transfer Capacitance			11		
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 4.5\text{ V}, V_{DS} = 30\text{ V}; I_D = 25\text{ A}$		4.5		nC
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 10\text{ V}, V_{DS} = 30\text{ V}; I_D = 25\text{ A}$		9.5		nC
$Q_{G(TH)}$	Threshold Gate Charge	$V_{GS} = 4.5\text{ V}, V_{DS} = 30\text{ V}; I_D = 25\text{ A}$		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		

SWITCHING CHARACTERISTICS (Note 5)

$t_{d(ON)}$	Turn-On Delay Time	$V_{GS} = 4.5\text{ V}, V_{DS} = 30\text{ V}, I_D = 25\text{ A}, R_G = 2.5\text{ }\Omega$		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, dI _S /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 $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

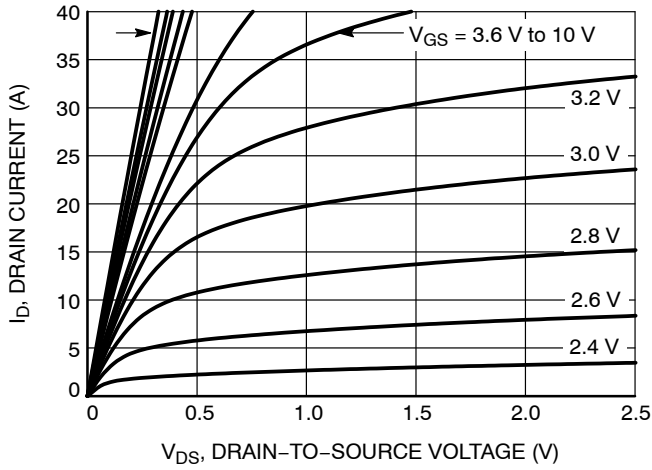


Figure 1. On-Region Characteristics

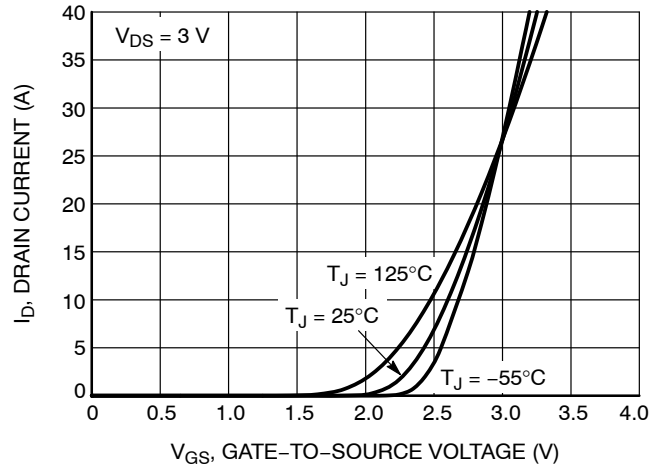


Figure 2. Transfer Characteristics

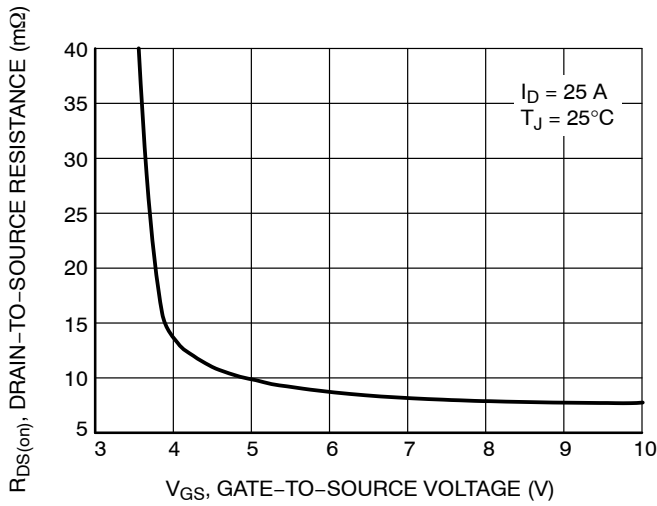


Figure 3. On-Resistance vs. Gate-to-Source Voltage

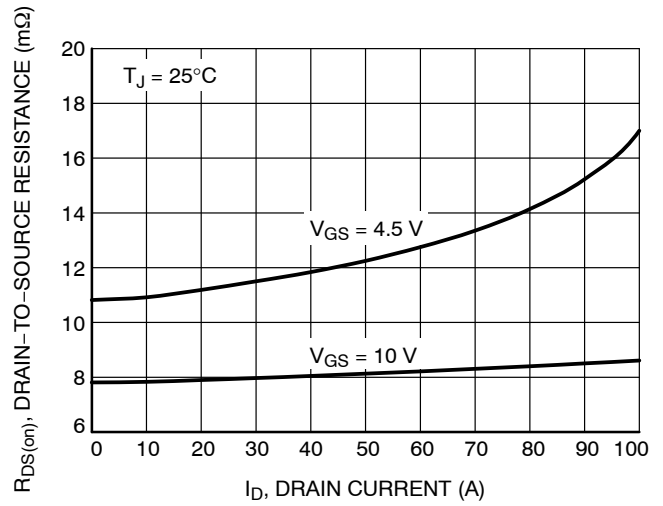


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

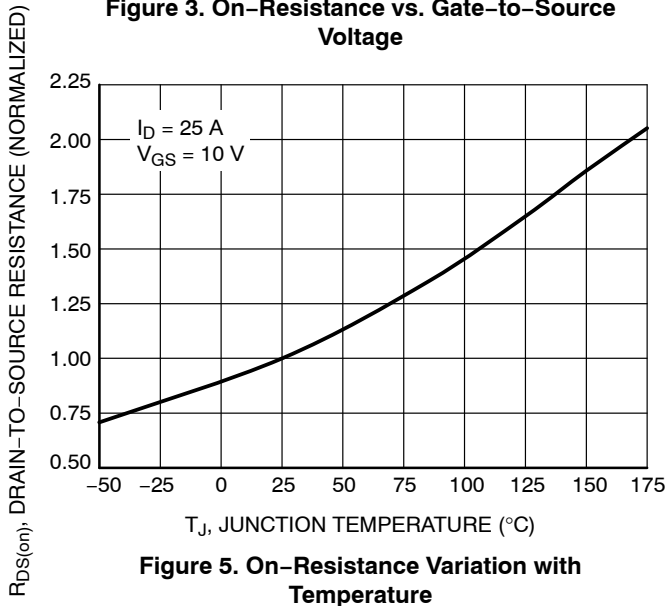


Figure 5. On-Resistance Variation with Temperature

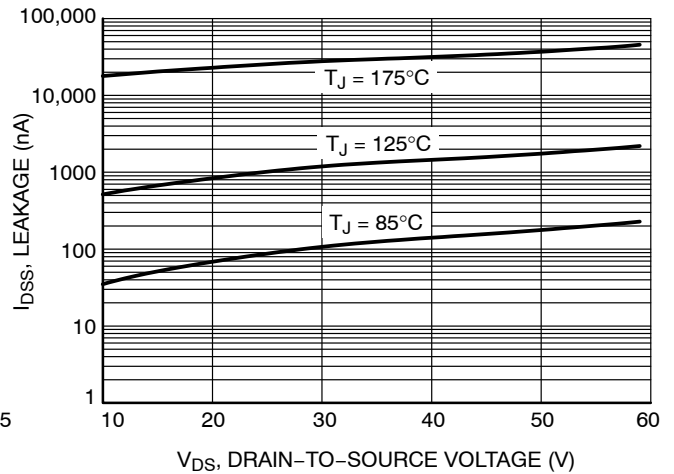


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

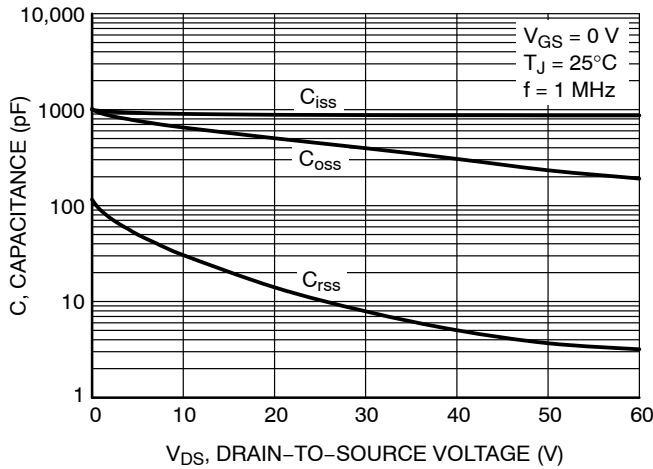


Figure 7. Capacitance Variation

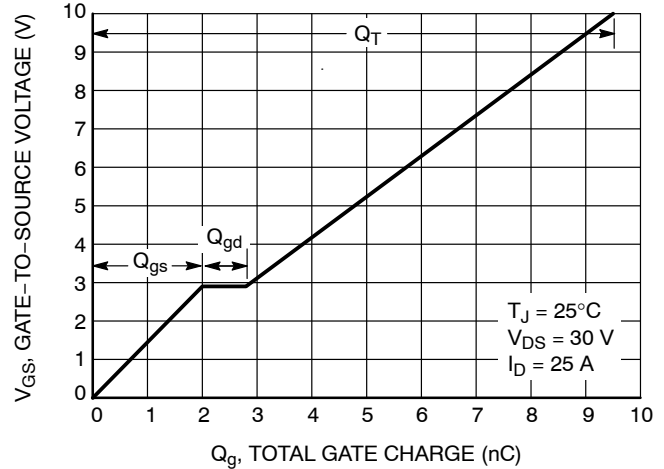


Figure 8. Gate-to-Source vs. Total Charge

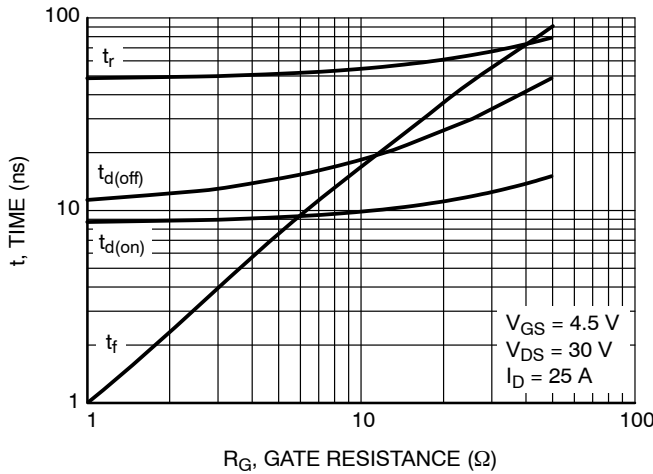


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

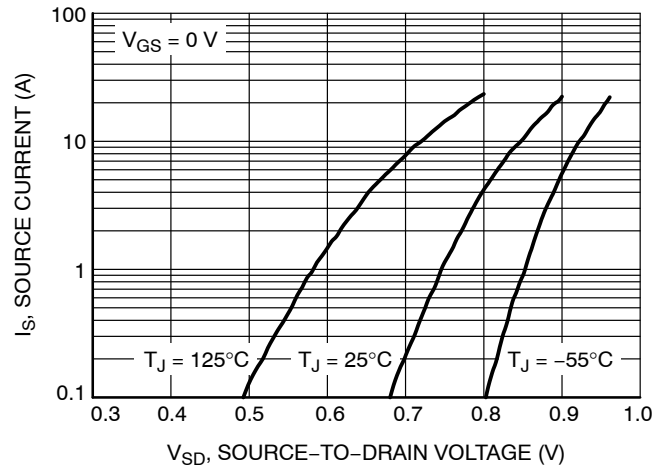


Figure 10. Diode Forward Voltage vs. Current

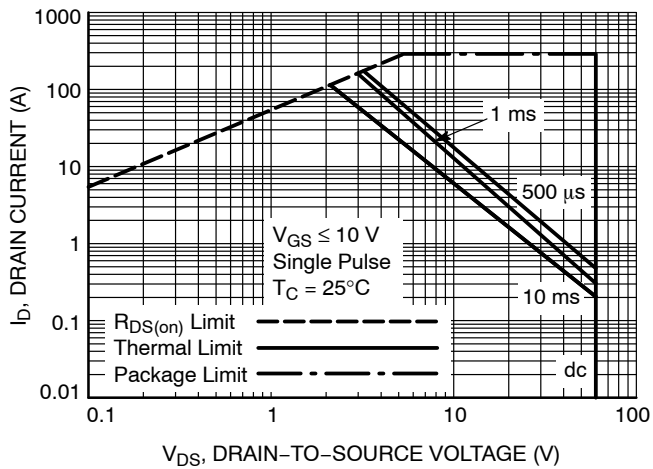


Figure 11. Maximum Rated Forward Biased Safe Operating Area

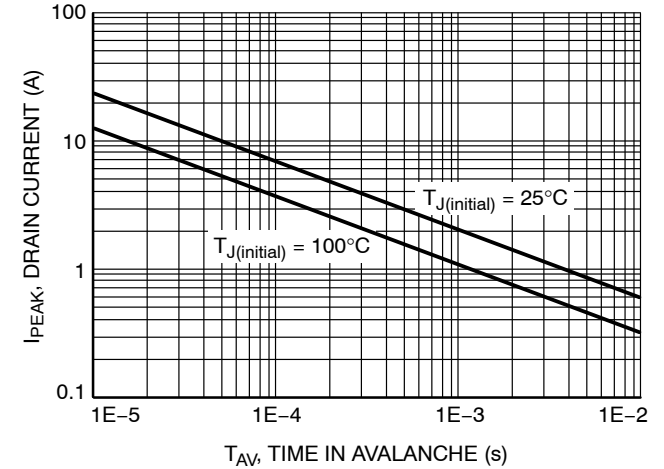


Figure 12. Maximum Drain Current vs. Time in Avalanche

NTTFS5CS73NL

TYPICAL CHARACTERISTICS (continued)

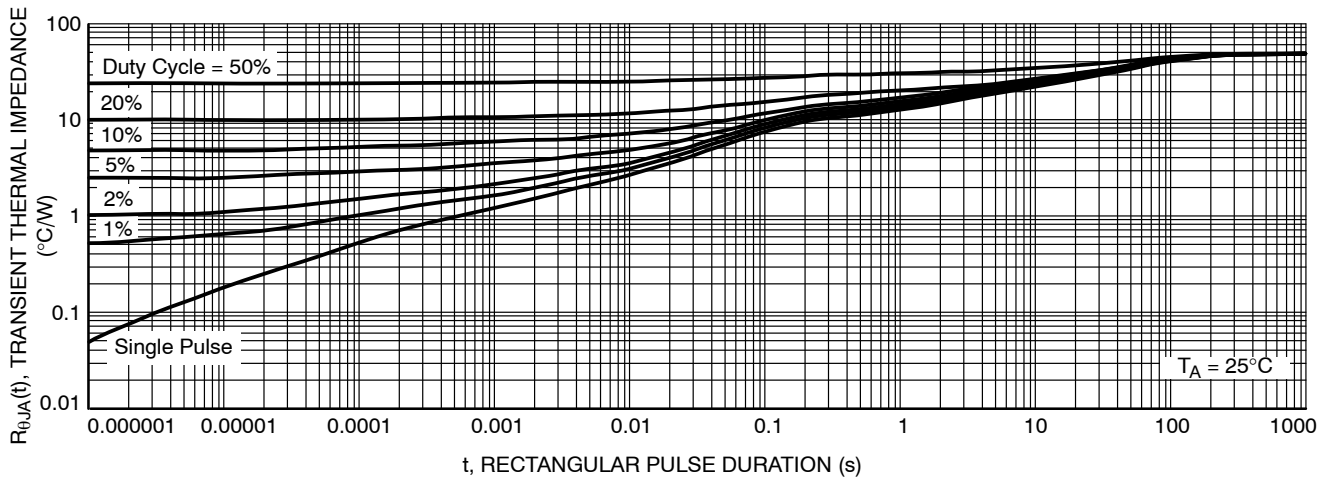


Figure 13. Thermal Response

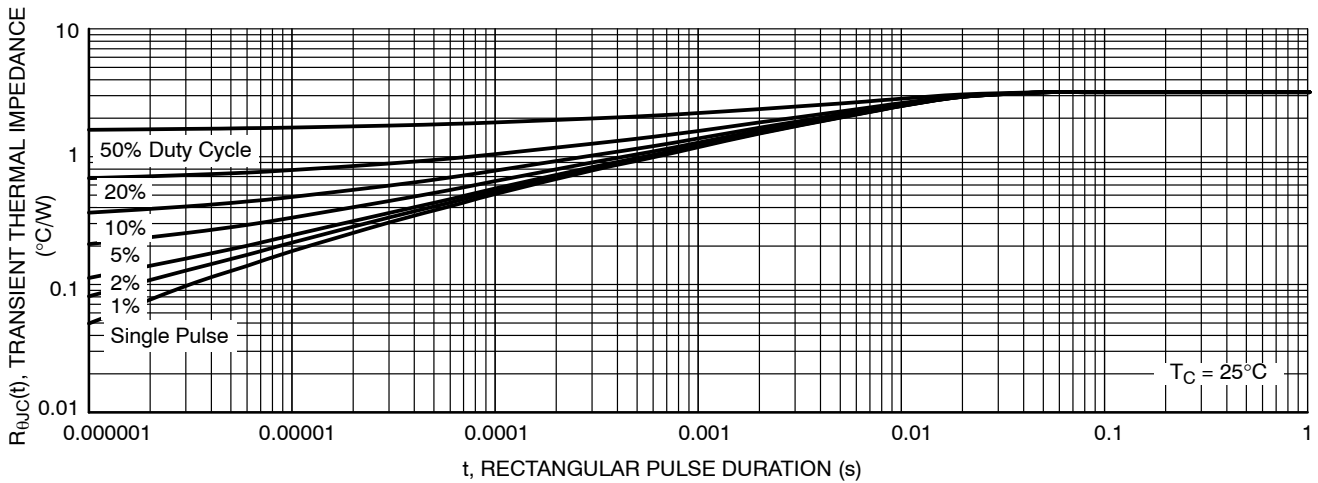


Figure 14. Thermal Response

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
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[†]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


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.

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.

DIM	MILLIMETERS			INCHES		
	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 °

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.

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