

# 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 <sub>DSS</sub>	Drain-to-Source Voltage			60	V
V <sub>GS</sub>	Gate-to-Source Voltage			±20	V
I <sub>D</sub>	Continuous Drain Current R <sub>θJC</sub> (Notes 1, 3)	Steady State	T <sub>C</sub> = 25°C	50	A
			T <sub>C</sub> = 100°C	35	
P <sub>D</sub>	Power Dissipation R <sub>θJC</sub> (Note 1)		T <sub>C</sub> = 25°C	46	W
			T <sub>C</sub> = 100°C	23	
I <sub>D</sub>	Continuous Drain Current R <sub>θJA</sub> (Notes 1, 2, 3)	Steady State	T <sub>A</sub> = 25°C	13	A
			T <sub>A</sub> = 100°C	9	
P <sub>D</sub>	Power Dissipation R <sub>θJA</sub> (Notes 1 & 2)		T <sub>A</sub> = 25°C	3.1	W
			T <sub>A</sub> = 100°C	1.6	
I <sub>DM</sub>	Pulsed Drain Current	T <sub>A</sub> = 25°C, t <sub>p</sub> = 10 μs		290	A
T <sub>J</sub> , T <sub>stg</sub>	Operating Junction and Storage Temperature			-55 to +175	°C
I <sub>S</sub>	Source Current (Body Diode)			52	A
E <sub>AS</sub>	Single Pulse Drain-to-Source Avalanche Energy (I <sub>L(pk)</sub> = 2.3 A)			88	mJ
T <sub>L</sub>	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.

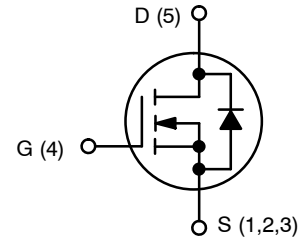
### THERMAL RESISTANCE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction-to-Case – Steady State	3.2	$^\circ\text{C/W}$
$R_{\theta JA}$	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 mm<sup>2</sup>, 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.

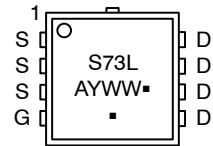
$V_{(BR)DSS}$	$R_{DS(ON)} \text{ MAX}$	$I_D \text{ MAX}$
60 V	9.3 mΩ @ 10 V	50 A
	13.3 mΩ @ 4.5 V	

### 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	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		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 $\Omega$
		$V_{GS} = 4.5\text{ V}, I_D = 25\text{ A}$		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 <sub>SD</sub>	Forward Diode Voltage	V <sub>GS</sub> = 0 V, I <sub>S</sub> = 25 A	T <sub>J</sub> = 25°C		0.9	1.2	V
			T <sub>J</sub> = 125°C		0.8		
t <sub>RR</sub>	Reverse Recovery Time	V <sub>GS</sub> = 0 V, dI <sub>S</sub> /dt = 100 A/μs, I <sub>S</sub> = 25 A			28		ns
t <sub>a</sub>	Charge Time				14		
t <sub>b</sub>	Discharge Time				14		
Q <sub>RR</sub>	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

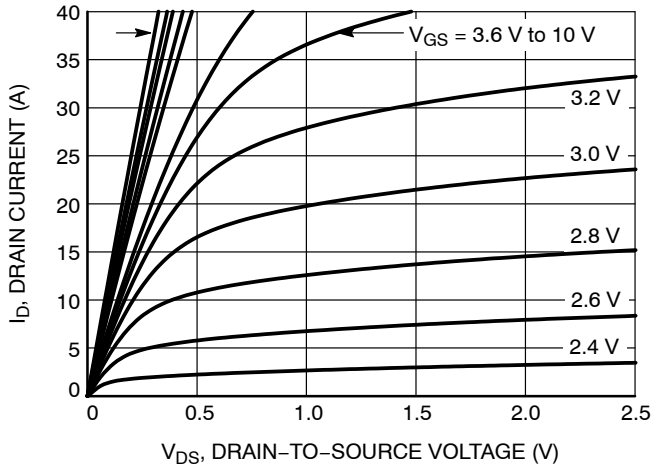


Figure 1. On-Region Characteristics

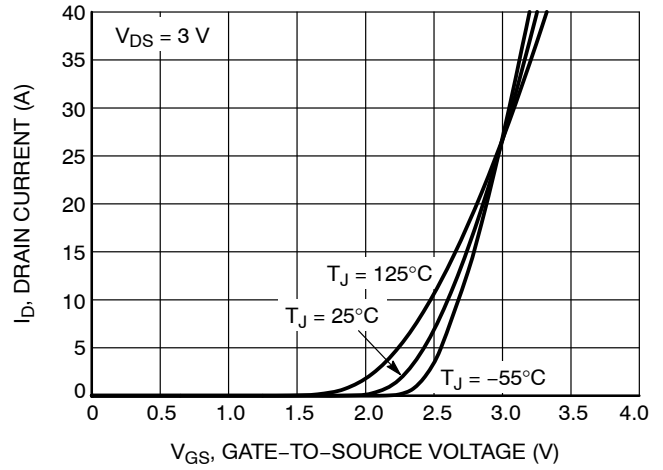


Figure 2. Transfer Characteristics

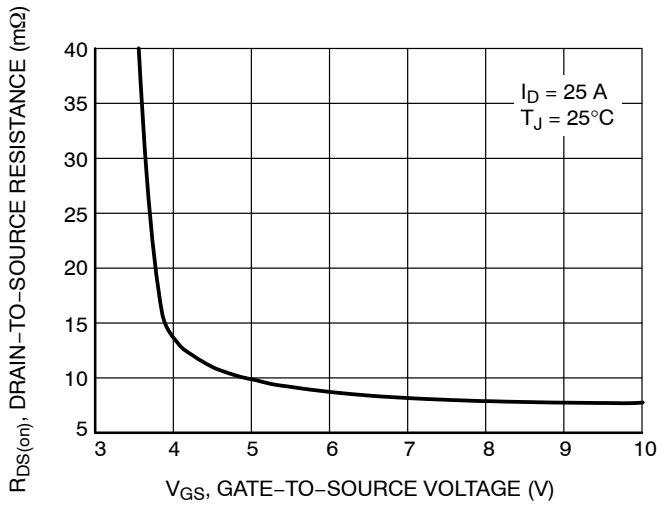


Figure 3. On-Resistance vs. Gate-to-Source Voltage

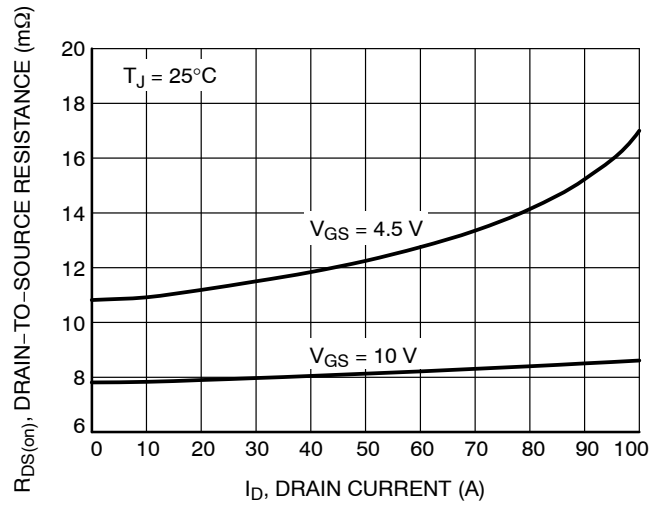


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

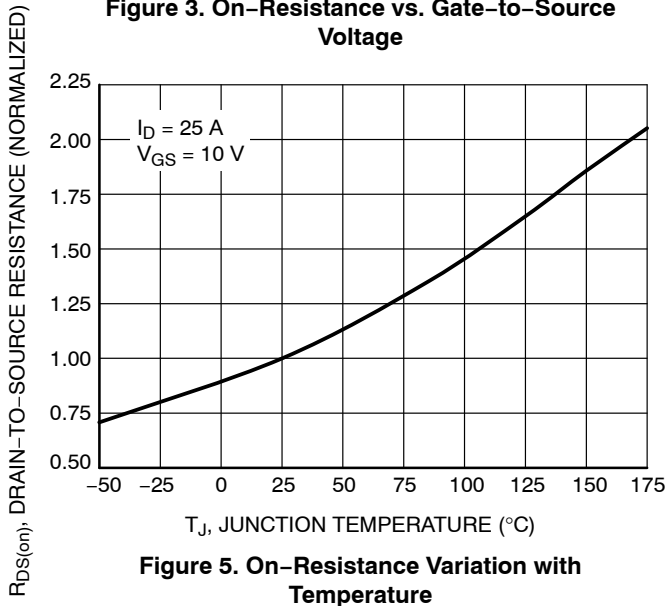


Figure 5. On-Resistance Variation with Temperature

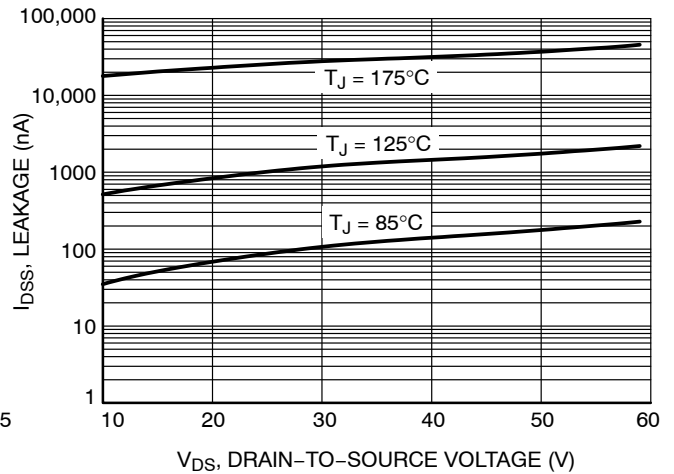


Figure 6. Drain-to-Source Leakage Current vs. Voltage

TYPICAL CHARACTERISTICS (continued)

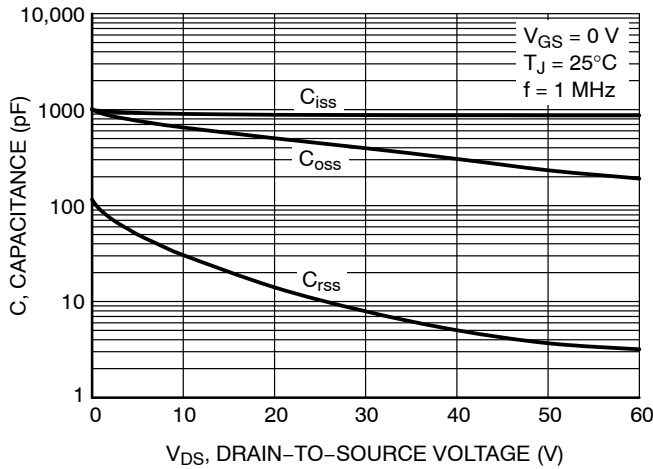


Figure 7. Capacitance Variation

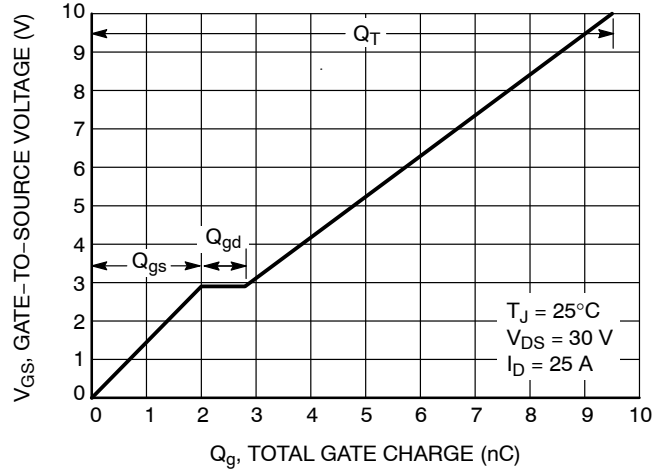


Figure 8. Gate-to-Source vs. Total Charge

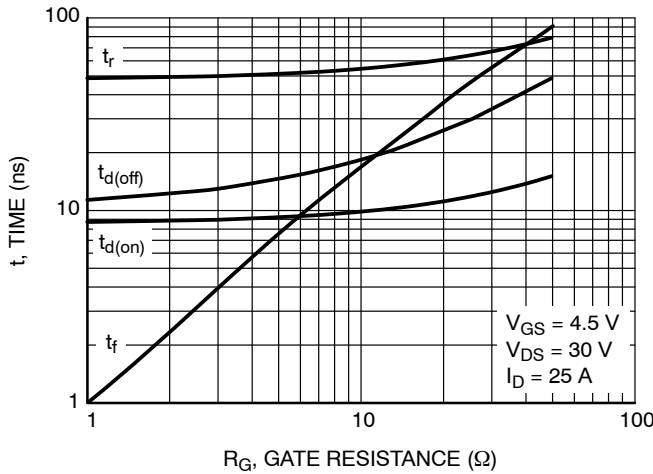


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

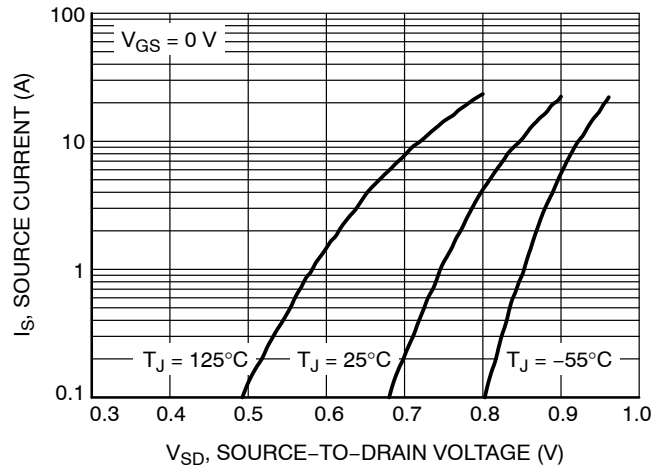


Figure 10. Diode Forward Voltage vs. Current

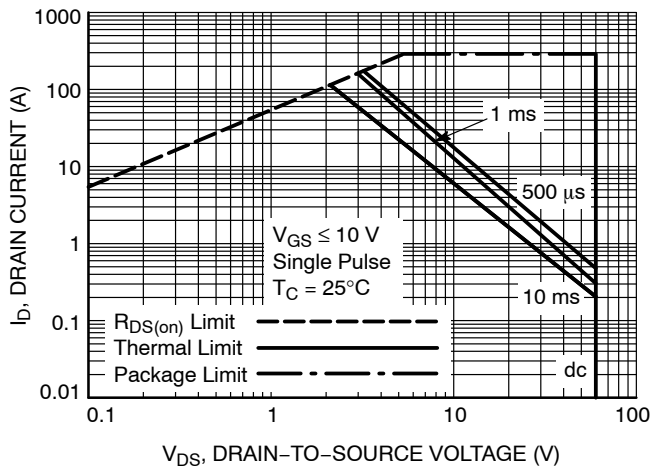


Figure 11. Maximum Rated Forward Biased Safe Operating Area

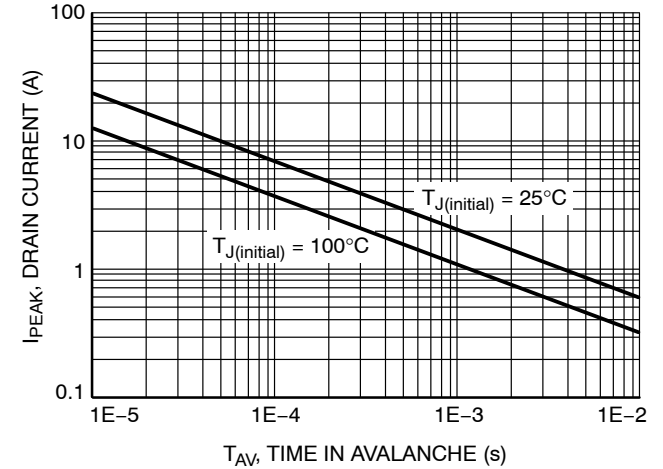


Figure 12. Maximum Drain Current vs. Time in Avalanche

# NTTFS5CS73NL

## TYPICAL CHARACTERISTICS (continued)

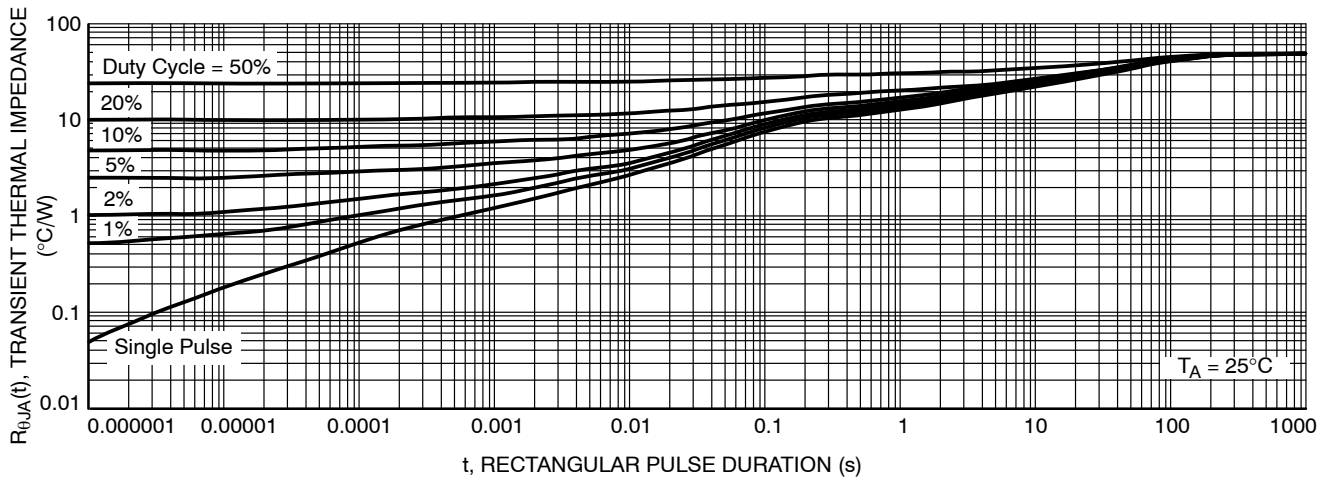


Figure 13. Thermal Response

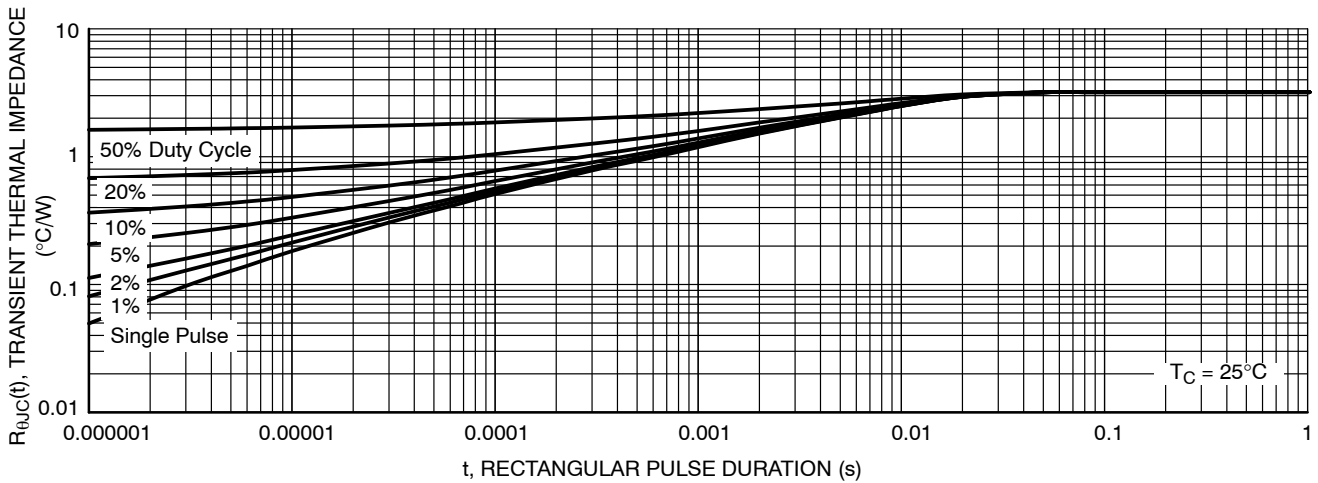


Figure 14. Thermal Response

### DEVICE ORDERING INFORMATION

Device	Marking	Package	Shipping <sup>†</sup>
NTTFS5CS73NLTAG	S73L	DFN5 (Pb-Free)	1500 / Tape & Reel

### DISCONTINUED (Note 6)

NTTFS5CS73NLTWG	S73L	DFN5 (Pb-Free)	5000 / Tape & Reel
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<sup>†</sup>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](http://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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