

NTZD3154NT5G-VB Datasheet

Dual N-Channel 20 V (D-S) MOSFET

PRODUCT SUMMARY			
V_{DS} (V)	$R_{DS(on)max}$ (Ω)	I_D (A)	Q_g (Typ.)
20	0.300 at $V_{GS} = 4.5$ V	0.6	0.75
	0.350 at $V_{GS} = 2.5$ V	0.4	
	0.420 at $V_{GS} = 1.8$ V	0.2	
	0.500 at $V_{GS} = 1.5$ V	0.05	

FEATURES

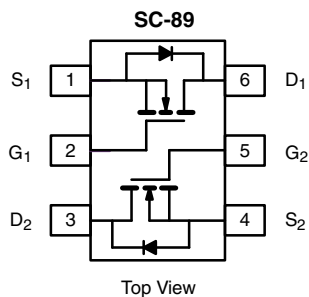
- Trench Power MOSFET
- 100 % R_g Tested



RoHS
COMPLIANT

APPLICATIONS

- Load/Power Switching for Portable Devices
- Drivers: Relays, Solenoids, Lamps, Hammers, Displays, Memories
- Battery Operated Systems
- Power Supply Converter Circuits



ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	± 12	
Continuous Drain Current ($T_J = 150^\circ\text{C}$) ^a	$T_A = 25^\circ\text{C}$	I_D	0.60 ^{a, b}	A
	$T_A = 70^\circ\text{C}$		0.49 ^{a, b}	
Pulsed Drain Current		I_{DM}	2	
Continuous Source-Drain Diode Current		I_S	0.18 ^{a, b}	A
Maximum Power Dissipation ^a	$T_A = 25^\circ\text{C}$	P_D	0.22 ^{a, b}	W
	$T_A = 70^\circ\text{C}$		0.14 ^{a, b}	
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	$t \leq 5$ s	R_{thJA}	470	565	$^\circ\text{C/W}$
	Steady State		560	675	

Notes:

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

b. $t = 5$ s.

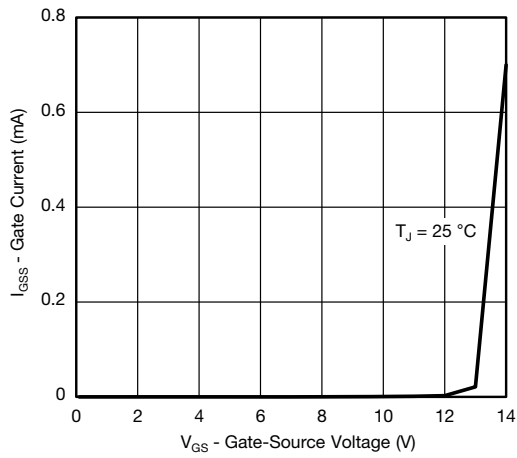
SPECIFICATIONS (T _J = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA	20			V
V _{DS} Temperature Coefficient	ΔV _{DS} /T _J	I _D = 250 μA		17		mV/°C
V _{GS(th)} Temperature Coefficient	ΔV _{GS(th)} /T _J			- 1.8		
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	0.4		1	V
Gate-Source Leakage	I _{GSS}	V _{DS} = 0 V, V _{GS} = ± 8 V			± 30	μA
		V _{DS} = 0 V, V _{GS} = ± 4.5 V			± 1	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 20 V, V _{GS} = 0 V			1	
		V _{DS} = 20 V, V _{GS} = 0 V, T _J = 85 °C			3	
On-State Drain Current ^a	I _{D(on)}	V _{DS} ≥ 5 V, V _{GS} = 4.5 V	2			A
Drain-Source On-State Resistance ^a	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 0.5 A		0.300		Ω
		V _{GS} = 2.5 V, I _D = 0.2 A		0.350		
		V _{GS} = 1.8 V, I _D = 0.2 A		0.420		
		V _{GS} = 1.5 V, I _D = 0.05 A		0.500		
Forward Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 0.5 A		7.5		S
Dynamic ^b						
Input Capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz		43		pF
Output Capacitance	C _{oss}			14		
Reverse Transfer Capacitance	C _{rss}			8		
Total Gate Charge	Q _g	V _{DS} = 10 V, V _{GS} = 8 V, I _D = 0.6 A		1.3	2	nC
Gate-Source Charge	Q _{gs}	V _{DS} = 10 V, V _{GS} = 4.5 V, I _D = 0.6 A		0.75	1.2	
Gate-Drain Charge	Q _{gd}			0.15		
				0.13		
Gate Resistance	R _g	f = 1 MHz	2.4	12.2	24.4	Ω
Turn-On Delay Time	t _{d(on)}	V _{DD} = 10 V, R _L = 20 Ω I _D ≅ 0.5 A, V _{GEN} = 4.5 V, R _g = 1 Ω		11	20	ns
Rise Time	t _r			16	24	
Turn-Off Delay Time	t _{d(off)}			26	39	
Fall Time	t _f			11	20	
Drain-Source Body Diode Characteristics						
Pulse Diode Forward Current ^a	I _{SM}				2	A
Body Diode Voltage	V _{SD}	I _S = 0.5 A		0.8	1.2	V
Body Diode Reverse Recovery Time	t _{rr}	I _F = 0.5 A, di/dt = 100 A/μs		10	15	ns
Body Diode Reverse Recovery Charge	Q _{rr}			2	4	nC
Reverse Recovery Fall Time	t _a			5		ns
Reverse Recovery Rise Time	t _b			5		

Notes:

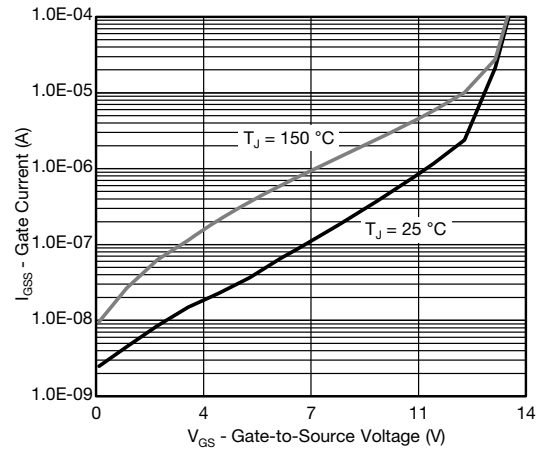
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

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.

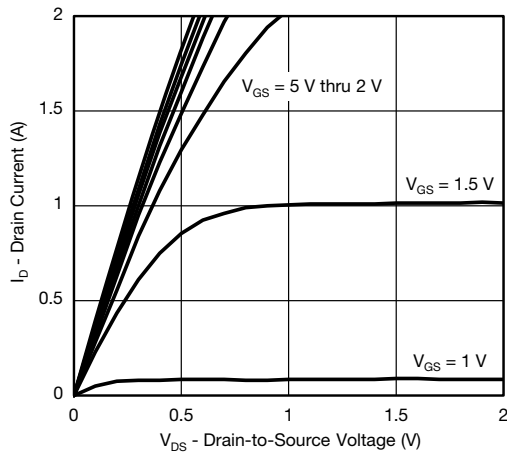
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



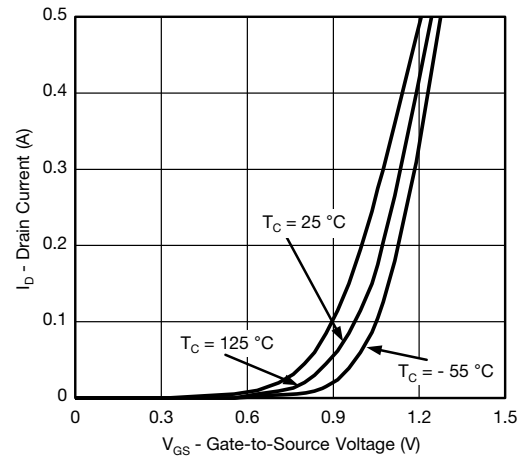
Gate Current vs. Gate-Source Voltage



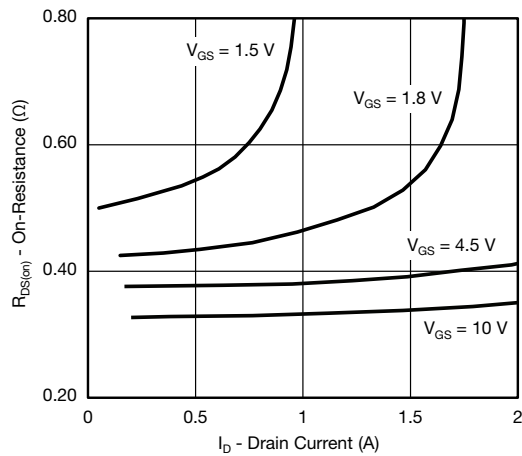
Gate Current vs. Gate-Source Voltage



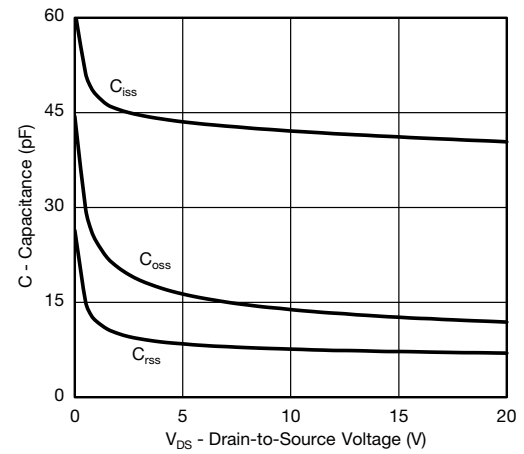
Output Characteristics



Transfer Characteristics

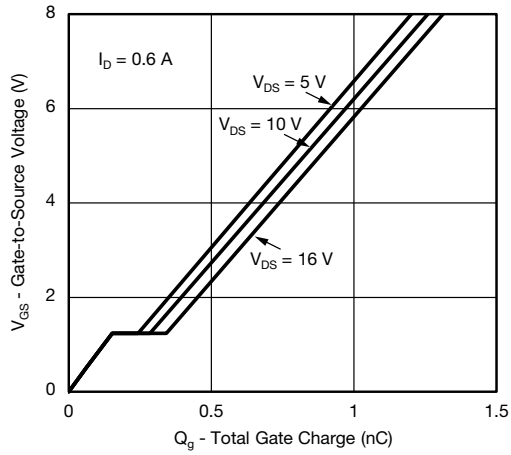


On-Resistance vs. Drain Current

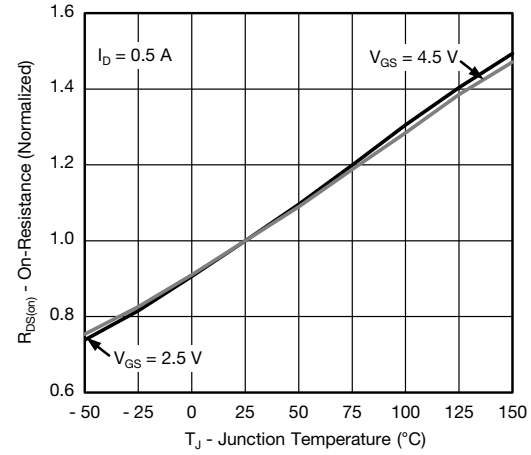


Capacitance

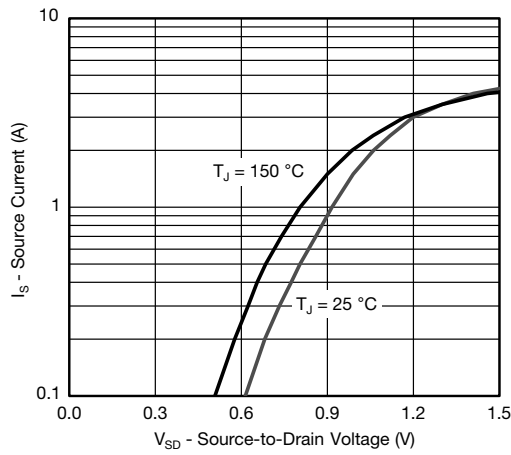
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



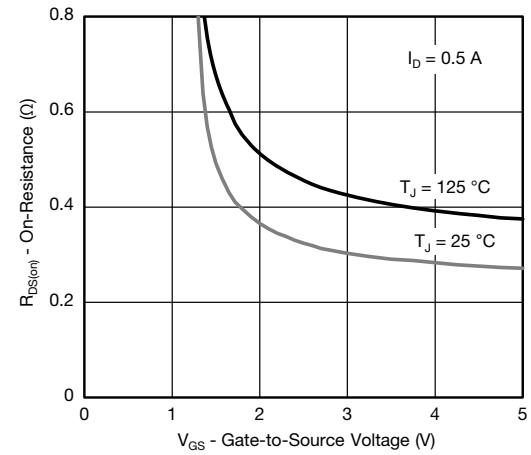
Gate Charge



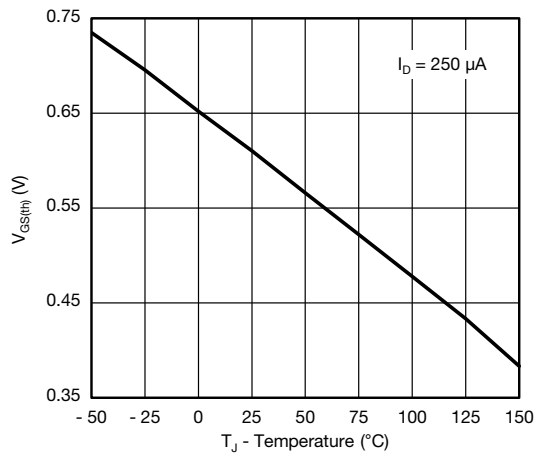
On-Resistance vs. Junction Temperature



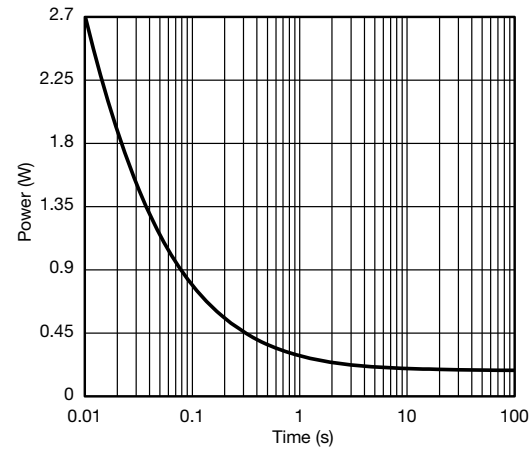
Source-Drain Diode Forward Voltage



On-Resistance vs. Gate-to-Source Voltage

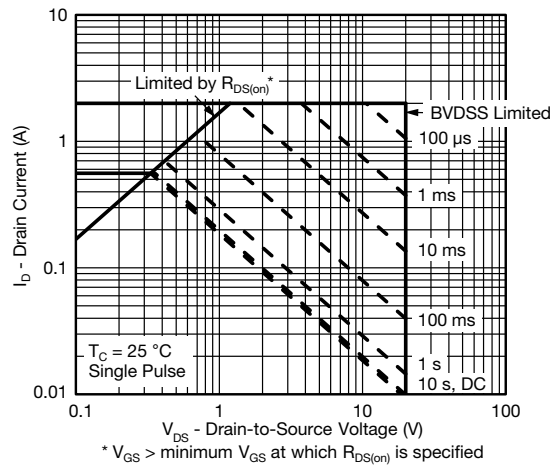


Threshold Voltage

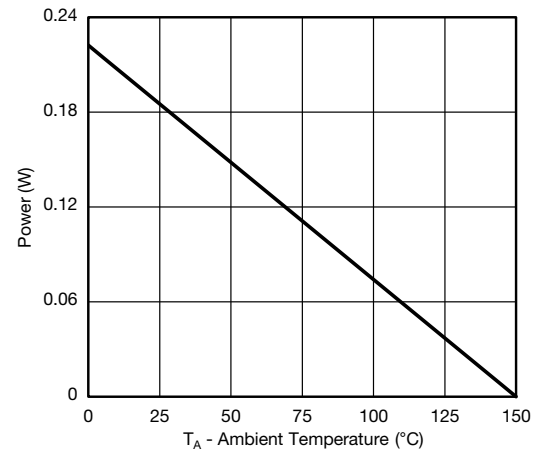


Single Pulse Power, Junction-to-Ambient

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

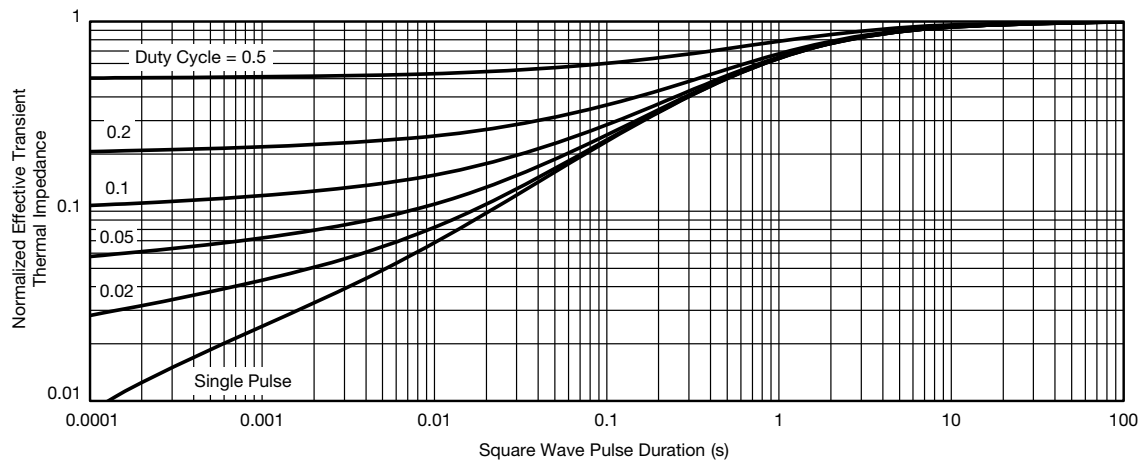


Safe Operating Area, Junction-to-Ambient



Power Derating, Junction-to-Ambient

* The power dissipation P_D is based on $T_{J(max)} = 150^\circ\text{C}$, 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.



Normalized Thermal Transient Impedance, Junction-to-Ambient

The technical drawing consists of three main views of a mechanical component:

- Front View (Top Left):** Shows a rectangular base with a central slot. Dimensions include overall width D , total height E , and slot width C . Internal features are labeled with e_1 , $2x$, $E/2$, E_1 , and A . Section lines indicate internal structures.
- Side View (Top Right):** Shows the profile of the component with dimensions B (width) and C (height). It is labeled "SECTION B-B".
- Top View (Bottom Left):** Shows the plan view of the component with dimensions L_1 (inner length) and L (outer length). It also shows the width A .

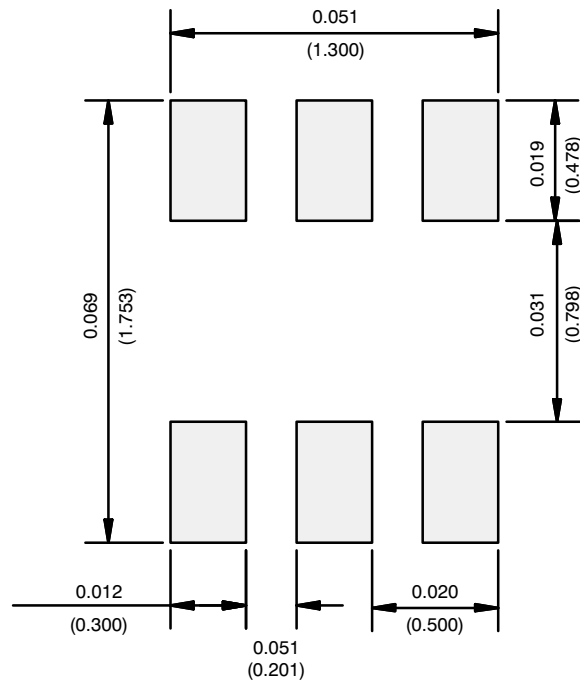
Additional details and sections shown include:

- DETAIL "A"**: A cross-sectional view showing the internal profile of the component.
- SECTION B-B**: A cross-sectional view showing the internal profile of the component.
- DETAIL "B"**: A cross-sectional view showing the internal profile of the component.

1. Dimensions in millimeters.

- | DIM. | MILLIMETERS | | |
|------|-------------|------|------|
| | MIN. | NOM. | MAX. |
| A | 0.56 | 0.58 | 0.60 |
| A1 | 0 | 0.02 | 0.10 |
| b | 0.15 | 0.22 | 0.30 |
| c | 0.10 | 0.14 | 0.18 |
| D | 1.50 | 1.60 | 1.70 |
| E | 1.50 | 1.60 | 1.70 |
| E1 | 1.15 | 1.20 | 1.25 |
| e | 0.45 | 0.50 | 0.55 |
| e1 | 0.95 | 1.00 | 1.05 |
| L | 0.25 | 0.35 | 0.50 |
| L1 | 0.10 | 0.20 | 0.30 |

RECOMMENDED MINIMUM PADS FOR SC-89: 6-Lead



Recommended Minimum Pads
Dimensions in Inches/(mm)

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