

Power MOSFET

60 V, 295 mA, Dual N-Channel with ESD Protection, SC-88

Features

- Low $R_{DS(on)}$
- Low Gate Threshold
- Low Input Capacitance
- ESD Protected Gate
- This is a Pb-Free Device

Applications

- Low Side Load Switch
- DC-DC Converters (Buck and Boost Circuits)

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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 (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	295	mA
		$T_A = 85^\circ\text{C}$	212	
	$t \leq 5$ s	$T_A = 25^\circ\text{C}$	304	
		$T_A = 85^\circ\text{C}$	219	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	250	mW
		$t \leq 5$ s	266	
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	900	mA
Operating Junction and Storage Temperature	T_J, T_{STG}	-55 to 150		$^\circ\text{C}$
Source Current (Body Diode)	I_S	210		mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260		$^\circ\text{C}$
Gate-Source ESD Rating (HBM)	ESD_{HBM}	2000		V
Gate-Source ESD Rating (MM)	ESD_{MM}	200		V

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE RATINGS

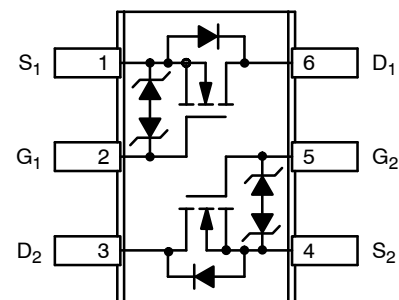
Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State	$R_{\theta JA}$	500	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5$ s	$R_{\theta JA}$	470	

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

NTJD5121N

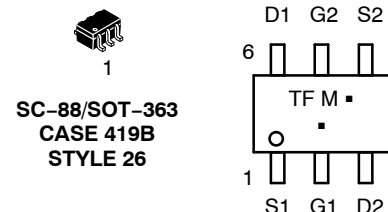
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D Max
60 V	1.6 Ω @ 10 V	295 mA
	2.5 Ω @ 4.5 V	

SC-88 (SOT-363)



Top View

MARKING DIAGRAM & PIN ASSIGNMENT



- TF = Device Code
- M = Date Code
- = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping†
NTJD5121NT1G	SC-88 (Pb-Free)	3000 / Tape & Reel
NTJD5121NT2G	SC-88 (Pb-Free)	3000 / 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.

NTJD5121N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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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	I _D = 250 μA, ref to 25°C		92		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		500	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±10	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.0	1.7	2.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			4.0		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 500 mA		1.0	1.6	Ω
		V _{GS} = 4.5 V, I _D = 200 mA		1.2	2.5	
Forward Transconductance	g _{FS}	V _{DS} = 5 V, I _D = 200 mA		80		S
Gate Resistance	R _G			536		Ω

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 20 V		26		pF
Output Capacitance	C _{OSS}			4.4		
Reverse Transfer Capacitance	C _{RSS}			2.5		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 4.5 V, V _{DS} = 25 V, I _D = 200 mA		0.9		nC
Threshold Gate Charge	Q _{G(TH)}			0.2		
Gate-to-Source Charge	Q _{GS}			0.3		
Gate-to-Drain Charge	Q _{GD}			0.28		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 4.5 V, V _{DD} = 25 V, I _D = 200 mA, R _G = 25 Ω		22		ns
Rise Time	t _r			34		
Turn-Off Delay Time	t _{d(off)}			34		
Fall Time	t _f			32		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 200 mA	T _J = 25°C		0.8	1.2	V
			T _J = 85°C		0.7		

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.