

# NTGD3149C

## Power MOSFET

Complementary, 20 V, +3.5/-2.7 A,  
TSOP-6 Dual

### Features

- Complementary N-Channel and P-Channel MOSFET
- Small Size (3 x 3 mm) Dual TSOP-6 Package
- Leading Edge Trench Technology for Low On Resistance
- Reduced Gate Charge to Improve Switching Response
- Independently Connected Devices to Provide Design Flexibility
- This is a Pb-Free Device

### Applications

- DC-DC Conversion Circuits
- Load/Power Switching with Level Shift

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V <sub>DS</sub>	20	V
Gate-to-Source Voltage (N-Ch & P-Ch)		V <sub>GS</sub>	±8	V
N-Channel Continuous Drain Current (Note 1)	Steady State T <sub>A</sub> = 25°C T <sub>A</sub> = 85°C	I <sub>D</sub>	3.2 2.3	A
	t ≤ 5 s T <sub>A</sub> = 25°C		3.5	
P-Channel Continuous Drain Current (Note 1)	Steady State T <sub>A</sub> = 25°C T <sub>A</sub> = 85°C	I <sub>D</sub>	2.4 1.7	A
	t ≤ 5 s T <sub>A</sub> = 25°C		2.7	
Power Dissipation (Note 1)	Steady State T <sub>A</sub> = 25°C	P <sub>D</sub>	0.9	W
	t ≤ 5 s		1.1	
Pulsed Drain Current	N-Ch t <sub>p</sub> = 10 μs	I <sub>DM</sub>	11	A
	P-Ch		8.0	
Operating Junction and Storage Temperature		T <sub>J</sub> , T <sub>STG</sub>	-55 to 150	°C
Source Current (Body Diode)		I <sub>S</sub>	0.8	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T <sub>L</sub>	260	°C

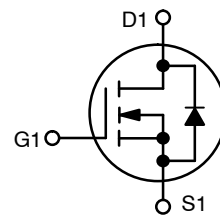
### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient – Steady State (Note 1)	R <sub>θJA</sub>	140	°C/W
Junction-to-Ambient – t ≤ 5 s (Note 1)	R <sub>θJA</sub>	110	°C/W

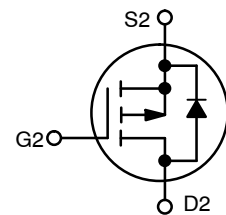
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

V <sub>(BR)DSS</sub>	R <sub>DS(on)</sub> MAX	I <sub>D</sub> MAX (Note 1)
N-Ch 20 V	60 mΩ @ 4.5 V	3.5 A
	90 mΩ @ 2.5 V	
P-Ch -20 V	110 mΩ @ 4.5 V	-2.7 A
	145 mΩ @ 2.5 V	



N-CHANNEL MOSFET

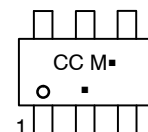


P-CHANNEL MOSFET



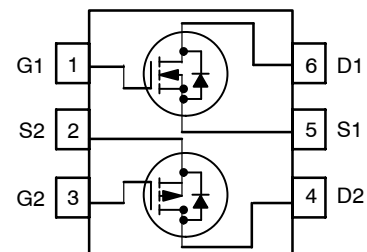
TSOP-6  
CASE 318G  
STYLE 13

### MARKING DIAGRAM



CC = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package  
(Note: Microdot may be in either location)

### PIN CONNECTION



(Top View)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 3 of this data sheet.



# NTGD3149C

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

Parameter	Symbol	N/P	Test Conditions	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>							
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	N	$V_{GS} = 0\text{ V}$	$I_D = 250\ \mu\text{A}$	20		V
		P		$I_D = -250\ \mu\text{A}$	-20		
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	N			1.1		mV/°C
		P			1.1		
Zero Gate Voltage Drain Current	$I_{DSS}$	N	$V_{GS} = 0\text{ V}, V_{DS} = 16\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	$\mu\text{A}$
		P	$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$			-1.0	
		N	$V_{GS} = 0\text{ V}, V_{DS} = 16\text{ V}$	$T_J = 85^\circ\text{C}$		10	
		P	$V_{GS} = 0\text{ V}, V_{DS} = -16\text{ V}$			-10	
Gate-to-Source Leakage Current	$I_{GSS}$	N	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	nA
		P	$V_{DS} = 0\text{ V}, V_{GS} = \pm 8\text{ V}$			$\pm 100$	

**ON CHARACTERISTICS** (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	N	$V_{GS} = V_{DS}$	$I_D = 250\ \mu\text{A}$	0.4	1.0	V
		P		$I_D = -250\ \mu\text{A}$	-0.4	-1.0	
Drain-to-Source On Resistance	$R_{DS(on)}$	N	$V_{GS} = 4.5\text{ V}, I_D = 3.5\text{ A}$		41	60	m $\Omega$
		P	$V_{GS} = -4.5\text{ V}, I_D = -2.7\text{ A}$		83	110	
		N	$V_{GS} = 2.5\text{ V}, I_D = 2.9\text{ A}$		51	90	
		P	$V_{GS} = -2.5\text{ V}, I_D = -2.4\text{ A}$		104	145	
		N	$V_{GS} = 1.8\text{ V}, I_D = 2.2\text{ A}$		67	150	
		P	$V_{GS} = -1.8\text{ V}, I_D = -1.9\text{ A}$		143	220	
Forward Transconductance	$g_{FS}$	N	$V_{DS} = 10\text{ V}, I_D = 3.5\text{ A}$		4.7		S
		P	$V_{DS} = -10\text{ V}, I_D = -2.7\text{ A}$		5.1		

**CHARGES AND CAPACITANCES**

Input Capacitance	$C_{ISS}$	N	$f = 1\text{ MHz}, V_{GS} = 0\text{ V}$	$V_{DS} = 10\text{ V}$		387	pF	
Output Capacitance	$C_{OSS}$					73		
Reverse Transfer Capacitance	$C_{RSS}$					43		
Input Capacitance	$C_{ISS}$			P	$V_{DS} = -10\text{ V}$			509
Output Capacitance	$C_{OSS}$							76
Reverse Transfer Capacitance	$C_{RSS}$							40
Total Gate Charge	$Q_{G(TOT)}$	N	$V_{GS} = 4.5\text{ V}, V_{DS} = 10\text{ V}, I_D = 2.0\text{ A}$ $R_G = 6\ \Omega$		4.6	5.5	nC	
Threshold Gate Charge	$Q_{G(TH)}$				0.3			
Gate-to-Source Gate Charge	$Q_{GS}$				0.7			
Gate-to-Drain "Miller" Charge	$Q_{GD}$				1.2			
Total Gate Charge	$Q_{G(TOT)}$	P	$V_{GS} = -4.5\text{ V}, V_{DS} = -10\text{ V}, I_D = -1.0\text{ A}$ $R_G = 6\ \Omega$		5.2	5.5		
Threshold Gate Charge	$Q_{G(TH)}$				0.4			
Gate-to-Source Gate Charge	$Q_{GS}$				1.0			
Gate-to-Drain "Miller" Charge	$Q_{GD}$				1.2			



# NTGD3149C

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	N/P	Test Conditions	Min	Typ	Max	Unit
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### SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t <sub>d(ON)</sub>	N	V <sub>GS</sub> = 4.5 V, V <sub>DD</sub> = 10 V, I <sub>D</sub> = 1.0 A, R <sub>G</sub> = 6.0 Ω		6.5		ns
Rise Time	t <sub>r</sub>				3.8		
Turn-Off Delay Time	t <sub>d(OFF)</sub>				16.4		
Fall Time	t <sub>f</sub>				2.4		
Turn-On Delay Time	t <sub>d(ON)</sub>	P	V <sub>GS</sub> = -4.5 V, V <sub>DD</sub> = -10 V, I <sub>D</sub> = -1.0 A, R <sub>G</sub> = 6.0 Ω		7.0		
Rise Time	t <sub>r</sub>				5.3		
Turn-Off Delay Time	t <sub>d(OFF)</sub>				33.3		
Fall Time	t <sub>f</sub>				29.5		

### DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V <sub>SD</sub>	N	V <sub>GS</sub> = 0 V, T <sub>J</sub> = 25 °C	I <sub>S</sub> = 0.8 A		0.7	1.2	V
		P		I <sub>S</sub> = -0.8 A		-0.7	-1.2	
Reverse Recovery Time	t <sub>RR</sub>	N	V <sub>GS</sub> = 0 V, dI <sub>S</sub> / dt = 100 A/μs		7.7		ns	
Charge Time	t <sub>a</sub>				4.5			
Discharge Time	t <sub>b</sub>				3.2			
Reverse Recovery Charge	Q <sub>RR</sub>				1.9			nC
Reverse Recovery Time	t <sub>RR</sub>	P	V <sub>GS</sub> = 0 V, dI <sub>S</sub> / dt = 100 A/μs		11.4		ns	
Charge Time	t <sub>a</sub>				7.5			
Discharge Time	t <sub>b</sub>				3.9			
Reverse Recovery Charge	Q <sub>RR</sub>				4.7			nC

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

3. Switching characteristics are independent of operating junction temperatures.

### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
NTGD3149CT1G	TSOP6 (Pb-Free)	3000 / Tape & Reel

<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.