

Power MOSFET

Complementary, 30 V, +2.9/-2.2 A, TSOP-6 Dual

NTGD4167C

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_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V _{DS}	30	V
Gate-to-Source Voltage (N-Ch & P-Ch)		V _{GS}	±12	V
N-Channel Continuous Drain Current (Note 1)	Steady State T _A = 25°C	I _D	2.6	A
	T _A = 85°C		1.9	
	t ≤ 5 s T _A = 25°C		2.9	
P-Channel Continuous Drain Current (Note 1)	Steady State T _A = 25°C	I _D	-1.9	A
	T _A = 85°C		-1.4	
	t ≤ 5 s T _A = 25°C		-2.2	
Power Dissipation (Note 1)	Steady State T _A = 25°C	P _D	0.9	W
	t ≤ 5 s		1.1	
Pulsed Drain Current	N-Ch	I _{DM}	8.6	A
	P-Ch		-6.3	
Operating Junction and Storage Temperature		T _J , T _{STG}	-55 to 150	°C
Source Current (Body Diode)		I _S	±0.9	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T _L	260	°C

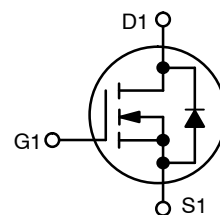
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Ambient - Steady State (Note 1)	R _{θJA}	140	°C/W
Junction-to-Ambient - t ≤ 5 s (Note 1)	R _{θJA}	110	°C/W

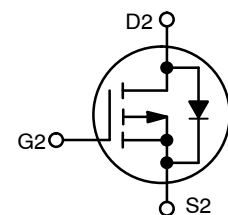
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

V _{(BR)DSS}	R _{DS(on)} MAX	I _D MAX (Note 1)
N-Ch 30 V	90 mΩ @ 4.5 V	2.6 A
	125 mΩ @ 2.5 V	2.2 A
P-Ch -30 V	170 mΩ @ -4.5 V	-1.9 A
	300 mΩ @ -2.5 V	-1.0 A



N-CHANNEL MOSFET

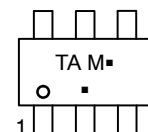


P-CHANNEL MOSFET



TSOP-6
CASE 318G
STYLE 13

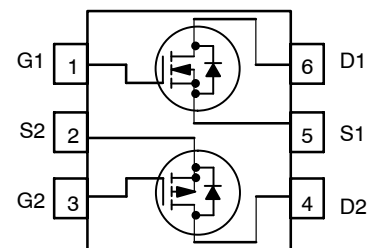
MARKING DIAGRAM



TA = Specific Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

PIN CONNECTION



(Top View)



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

Parameter	Symbol	N/P	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	N	V _{GS} = 0 V	I _D = 250 μA	30		V
		P		I _D = -250 μA	-30		
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J	N			21.4		mV/°C
		P			22.2		
Zero Gate Voltage Drain Current	I _{DSS}	N	V _{GS} = 0 V, V _{DS} = 24 V	T _J = 25 °C		1.0	μA
		P	V _{GS} = 0 V, V _{DS} = -24 V			-1.0	
		N	V _{GS} = 0 V, V _{DS} = 24 V	T _J = 85 °C		10	
		P	V _{GS} = 0 V, V _{DS} = -24 V			-10	
Gate-to-Source Leakage Current	I _{GSS}	N	V _{DS} = 0 V, V _{GS} = ±12 V			±100	nA
		P	V _{DS} = 0 V, V _{GS} = ±12 V			±100	

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	N	V _{GS} = V _{DS}	I _D = 250 μA	0.5	0.9	1.5	V	
		P		I _D = -250 μA	-0.5	-1.1	-1.5		
Drain-to-Source On Resistance	R _{DS(on)}	N	V _{GS} = 4.5 V, I _D = 2.6 A			52	90	mΩ	
							67		125
		P					130		170
						V _{GS} = -2.5 V, I _D = -1.0 A			202
Forward Transconductance	g _{FS}	N	V _{DS} = 15 V, I _D = 2.6 A		2.6		S		
		P	V _{DS} = -15 V, I _D = -1.9 A		2.6				

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	N	f = 1 MHz, V _{GS} = 0 V	V _{DS} = 15 V		295		pF		
Output Capacitance	C _{OSS}					48				
Reverse Transfer Capacitance	C _{RSS}					27				
Input Capacitance	C _{ISS}				P	V _{DS} = -15 V			419	
Output Capacitance	C _{OSS}								51	
Reverse Transfer Capacitance	C _{RSS}								26	
Total Gate Charge	Q _{G(TOT)}		3.7	5.5						
Threshold Gate Charge	Q _{G(TH)}	N	V _{GS} = 4.5 V, V _{DS} = 15 V, I _D = 2.0 A		0.6		nC			
Gate-to-Source Gate Charge	Q _{GS}				0.9					
Gate-to-Drain "Miller" Charge	Q _{GD}				0.8					
Total Gate Charge	Q _{G(TOT)}				3.9	6.0				
Threshold Gate Charge	Q _{G(TH)}	P	V _{GS} = -4.5 V, V _{DS} = -15 V, I _D = -2.0 A		0.6					
Gate-to-Source Gate Charge	Q _{GS}				1.0					
Gate-to-Drain "Miller" Charge	Q _{GD}				1.0					

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(ON)}	N	V _{GS} = 4.5 V, V _{DD} = 15 V, I _D = 1.0 A, R _G = 6.0 Ω		7.0		ns
Rise Time	t _r				4.0		
Turn-Off Delay Time	t _{d(OFF)}				14		
Fall Time	t _f				2.0		
Turn-On Delay Time	t _{d(ON)}	P	V _{GS} = -4.5 V, V _{DD} = -15 V, I _D = -1.0 A, R _G = 6.0 Ω		8.0		
Rise Time	t _r				8.0		
Turn-Off Delay Time	t _{d(OFF)}				22		
Fall Time	t _f				8.0		

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



3. Switching characteristics are independent of operating junction temperatures.

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

Parameter	Symbol	N/P	Test Conditions	Min	Typ	Max	Unit
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V _{SD}	N	V _{GS} = 0 V, T _J = 25 °C	I _S = 0.9 A	0.7	1.2	V
		P		I _S = -0.9 A	-0.8	-1.2	
Reverse Recovery Time	t _{RR}	N	V _{GS} = 0 V, dI _S / dt = 100 A/μs, I _S = 0.9 A		8.0		ns
Charge Time	t _a				5.0		
Discharge Time	t _b				3.0		
Reverse Recovery Charge	Q _{RR}				3.0		
Reverse Recovery Time	t _{RR}	P	V _{GS} = 0 V, dI _S / dt = 100 A/μs, I _S = -0.9 A		12		ns
Charge Time	t _a				10		
Discharge Time	t _b				2.0		
Reverse Recovery Charge	Q _{RR}				7.0		