

NTE2380 (N-Ch) & NTE2381 (P-Ch) Complementary Silicon Gate MOSFETs Enhancement Mode, High Speed Switch

Description:

The NTE2380 (N-Ch) and NTE2381 (P-Ch) are complementary TMOS power FETs in a TO220 type package designed for high voltage, high speed power switching applications such as switching regulators, converters, solenoid, and relay drivers.

Features:

- Silicon Gate for Fast Switching Speeds
- Rugged – SOA is Power Dissipation Limited
- Source-to-Drain Diode Characterized for Use With Inductive Loads

Absolute Maximim Ratings:

Drain-Source Voltage, V_{DSS}	500V
Drain-Gate Voltage ($R_{GS} = 1M\Omega$), V_{DGR}	500V
Gate-Source Voltage, V_{GS}	$\pm 20V$
Drain Current, I_D	
Continuous	
NTE2380	2.5A
NTE2381	2.0A
Pulsed	
NTE2380	10A
NTE2381	8A
Total Power Dissipation ($T_C = +25^\circ C$), P_D	
NTE2380	40W
Derate Above $25^\circ C$	$0.32W/^\circ C$
NTE2381	75W
Derate Above $25^\circ C$	$0.6W/^\circ C$
Operating Temperature Range, T_{opr}	
NTE2380	-55° to $+150^\circ C$
NTE2381	-65° to $+150^\circ C$
Storage Temperature Range, T_{stg}	
NTE2380	-55° to $+150^\circ C$
NTE2381	-65° to $+150^\circ C$
Thermal Resistance, Junction-to-Ambient, R_{thJA}	$62.5^\circ C/W$
Thermal Resistance, Junction-to-Case, R_{thJC}	
NTE2380	$3.12^\circ C/W$
NTE2381	$1.67^\circ C/W$
Maximum Lead Temperature (During Soldering, 1/8" from case, 5sec), T_L	
NTE2380	$+300^\circ C$
NTE2381	$+275^\circ C$

Electrical Characteristics: ($T_C = +25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
OFF Characteristics							
Drain–Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0, I _D = 0.25mA		500	–	–	V
Zero Gate Voltage Drain Current NTE2380	I _{DSS}	V _{DS} = 500V, V _{GS} = 0		–	–	0.25	mA
NTE2381				–	–	0.2	mA
NTE2380 & NTE2381		V _{DS} = 400V, V _{GS} = 0, T _J = +125°C		–	–	1.0	mA
Gate–Body Leakage Current, Forward NTE2380	I _{GSSF}	V _{GSF} = 20V, V _{DS} = 0		–	–	500	nA
NTE2381				–	–	100	nA
Gate–Body Leakage Current, Reverse NTE2380	I _{GSSR}	V _{GSF} = 20V, V _{DS} = 0		–	–	500	nA
NTE2381				–	–	100	nA
ON Characteristics (Note 1)							
Gate Threshold Voltage NTE2380	V _{GS(th)}	V _{DS} = V _{GS}	I _D = 0.25mA	2.0	–	4.0	V
NTE2381			I _D = 1mA	2.0	–	4.5	V
Static Drain–Source On–Resistance NTE2380	r _{DS(on)}	V _{GS} = 10V, I _D = 1A		–	–	3	Ω
NTE2381				–	–	6	Ω
Forward Transconductance NTE2380	g _{FS}	I _D = 1A	V _{DS} ≥ 7.5V	1	–	–	mhos
NTE2381			V _{DS} = 15V	0.5	–	–	mhos
Dynamic Characteristics							
Input Capacitance NTE2380	C _{iss}	V _{DS} = 25V, V _{GS} = 0, f = 1MHz		–	–	400	pF
NTE2381				–	–	100	pF
Output Capacitance NTE2380	C _{oss}			–	–	150	pF
NTE2381				–	–	200	pF
Reverse Transfer Capacitance NTE2380	C _{rss}			–	–	40	pF
NTE2381		–	–	80	pF		
Switching Characteristics (Note 1)							
Turn–On Time NTE2380	t _{d(on)}	I _D = 1A, R _{gen} = 50Ω	V _{DD} □ 200V	–	–	60	ns
NTE2381			V _{DS} = 125V	–	–	50	ns
Rise Time NTE2380	t _r		V _{DD} □ 200V	–	–	50	ns
NTE2381			V _{DS} = 125V	–	–	100	ns
Turn–Off Time NTE2380	t _{d(off)}		V _{DD} □ 200V	–	–	60	ns
NTE2381			V _{DS} = 125V	–	–	150	ns
Fall Time NTE2380	t _f		V _{DD} □ 200V	–	–	30	ns
NTE2381			V _{DS} = 125V	–	–	50	ns

Note 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

Electrical Characteristics (Cont'd): ($T_C = +25^{\circ}\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Switching Characteristics (Cont'd) (Note 1)						
Total Gate Charge NTE2380	Q _g	V _{GS} = 10V, V _{DS} = 400V, I _D = Rated I _D	–	12	15	ns
NTE2381			–	20	25	ns
Gate–Source Charge NTE2380	Q _{gs}		–	6	–	ns
NTE2381			–	10	–	ns
Gate–Drain Charge NTE2380	Q _{gd}		–	6	–	ns
NTE2381			–	10	–	ns
Source Drain Diode Characteristics (Note 1)						
Forward On–Voltage NTE2380	V _{SD}	I _S = Rated I _D , V _{GS} = 0	–	–	1.6	V
NTE2381			–	1.8	2.5	V
Forward Turn–On Time	t _{on}		Limited by stray inductance			
Reverse Recovery Time NTE2380	t _{rr}		–	500	–	ns
NTE2381			–	120	–	ns
Internal Package Inductance						
Internal Drain Inductance	L _d	Measured from contact screw on tab to center of die	–	3.5	–	nH
		Measured from the drain lead 0.25" from package to center of die	–	4.5	–	nH
Internal Source Inductance	L _s	Measured from the source lead 0.25" from package to center of pad	–	7.5	–	nH

Note 1. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.

