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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} = 1MΩ), V_{DGR} 500V

Gate–Source Voltage, V_{GS} . . . . . ±20V

Drain Current, I_D

- Continuous
  - NTE2380 . . . . . 2.5A
  - NTE2381 . . . . . 2.0A
- Pulsed
  - NTE2380 . . . . . 10A
  - NTE2381 . . . . . 8A

Total Power Dissipation (T_C = +25°C), P_D

- NTE2380 . . . . . 40W
  - Derate Above 25°C . . . . . 0.32W/°C
- NTE2381 . . . . . 75W
  - Derate Above 25°C . . . . . 0.6W/°C

Operating Temperature Range, T_{opr}

- NTE2380 . . . . . –55° to +150°C
- NTE2381 . . . . . –65° to +150°C

Storage Temperature Range, T_{stg}

- NTE2380 . . . . . –55° to +150°C
- NTE2381 . . . . . –65° to +150°C

Thermal Resistance, Junction–to–Ambient, R_{thJA} . . . . . 62.5°C/W

Thermal Resistance, Junction–to–Case, R_{thJC}

- NTE2380 . . . . . 3.12°C/W
- NTE2381 . . . . . 1.67°C/W

Maximum Lead Temperature (During Soldering, 1/8” from case, 5sec), T_L

- NTE2380 . . . . . +300°C
- NTE2381 . . . . . +275°C

Electrical Characteristics: (T_C = +25°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	$V_{DS} \geq$ 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 ≤ 300μs, Duty Cycle ≤ 2%.

Electrical Characteristics (Cont'd): (T_C = +25°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 ≤ 300μs, Duty Cycle ≤ 2%.