

## NTE5700 thru NTE5705 Industrial Power Module

**Description:**

The NTE5700 through NTE5705 series of Integrated Power Circuits consist of power thyristors and power diodes configured in a single package. Applications include power supplies, control circuits and battery chargers.

**Features:**

- D Glass Passivated Junctions for Greater Reliability
- D Electrically Isolated Base Plate
- D High Dynamic Characteristics

**Absolute Maximum Ratings:**

Maximum Repetitive Peak Reverse Voltage ( $V_S \leq 0$ ), $V_{RRM}$ .....	1200V
Maximum Non-Repetitive Peak Reverse Voltage, $V_{RSM}$ .....	1300V
Maximum Repetitive Peak Off State Voltage Gate Open Circuit, $V_{DRM}$ .....	1200V

**Thermal and Mechanical Characteristics:**

Junction Operating Temperature Range, $T_J$ .....	-40° to +125°C
Storage Temperature Range, $T_{stg}$ .....	-40° to +150°C
Maximum Internal Thermal Resistance, One Junction to Case, $R_{thJC}$	
DC Operation .....	2.24K/W
Maximum Thermal Resistance, Base to Heatsink, $R_{thCS}$	
Mounting Surface Smooth and Greased .....	0.10K/W
Mounting Torque, Base to Heatsink $\pm 10\%$ (Note 1), T .....	5Nm
Approximate Weight, wt .....	58g (2.0oz)

Note 1. A mounting compound is recommended and the torque should be checked after a period of about 3 hours to allow for the spread of the compound.

### Electrical Characteristics:

Parameter	Symbol	Test Conditions		Rating	Unit	
<b>Forward Conduction</b>						
Maximum DC Output Current	$I_O$	$T_C = +85^\circ\text{C}$ , Full Bridge Circuits (NTE5700, NTE5701, NTE5702)		25	A	
Maximum Average On-State and Forward Current	$I_{T(AV)}$ $I_{F(AV)}$	180° Sine Wave Conduction Circuits (All Types)		12.5	A	
Maximum RMS Current	$I_{RMS}$	180° Sine Wave Conduction Circuit (NTE5702)		28	A	
Maximum Peak, One-Cycle Non-Repetitive On-State or Forward Current	$I_{TSM}$ or $I_{FSM}$	10ms	100% $V_{RRM}$ Reapplied	Sinusoidal Half Wave, Initial $T_J = T_J \text{ Max}$	300	A
		8.3ms			315	A
		10ms	No Voltage Reapplied		357	A
		8.3ms			375	A
Maximum $I^2t$ for Fusing	$I^2t$	10ms	100% $V_{RRM}$ Reapplied	Initial $T_J = T_J \text{ Max}$	450	$A^2s$
		8.3ms			410	$A^2s$
		10ms	No Voltage Reapplied		637	$A^2s$
		8.3ms			580	$A^2s$
Maximum $I^2\sqrt{t}$ for Fusing	$I^2\sqrt{t}$	$t = 0.1$ to 10ms, No Voltage Reapplied, Note 2		6365	$A^2\sqrt{s}$	
Maximum Value of Threshold Voltage	$V_{T(TO)}$	$T_J = +125^\circ\text{C}$		0.82	V	
Maximum Value of On-State Slope Resistance	$r_T$	$T_J = +125^\circ\text{C}$		12	$m\Omega$	
Maximum Peak On-State or Forward Voltage	$V_{TM}$	$I_{TM} = \pi \times I_{T(AV)}$	$T_J = +25^\circ\text{C}$ , 180° Condition	1.35	V	
	$V_{FM}$	$I_{FM} = \pi \times I_{F(AV)}$		1.35	V	
Maximum Non-Repetitive Rate of Rise of Turned On Circuit	$di/dt$	$T_J = +125^\circ\text{C}$ , from $0.67V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500\text{mA}$ , $t_r < 0.5\mu\text{s}$ , $t_p > 6\mu\text{s}$		200	$A/\mu\text{s}$	
Maximum Holding Current	$I_H$	$T_J = +25^\circ\text{C}$ , Anode Supply = 6V, Resistive Load, Gate Open Circuit		100	mA	
Maximum Latching Current	$I_L$	$T_J = +25^\circ\text{C}$ , Anode Supply = 6V, Resistive Load		250	mA	
<b>Triggering</b>						
Maximum Peak Gate Power	$P_{GM}$			8.0	W	
Maximum Average Gate Power	$P_{G(AV)}$			2.0	W	
Maximum Peak Gate Current	$I_{GM}$			2.0	A	
Maximum Peak Negative Gate Voltage	$-V_{GM}$			10	V	
Maximum Gate Voltage Required to Trigger	$V_{GT}$	$T_J = -40^\circ\text{C}$		Anode Supply = 6V Resistive Load	3.0	V
		$T_J = +25^\circ\text{C}$			2.0	V
		$T_J = +125^\circ\text{C}$			1.0	V

### Electrical Characteristics (Cont'd):

Parameter	Symbol	Test Conditions	Rating	Unit	
<b>Triggering (Cont'd)</b>					
Maximum Gate Current Required to Trigger	$I_{GT}$	$T_J = -40^\circ\text{C}$	Anode Supply = 6V Resistive Load	90	mA
		$T_J = +25^\circ\text{C}$		60	mA
		$T_J = +125^\circ\text{C}$		35	mA
Maximum Gate Voltage that will not Trigger	$V_{GD}$	$T_J = +125^\circ\text{C}$ , Rated $V_{DRM}$ Applied	0.2	V	
<b>Blocking</b>					
Maximum Critical Rate of Rise of Off-State Voltage	$dv/dt$	$T_J = +125^\circ\text{C}$ , Exponential to $0.67V_{DRM}$ , Gate Open Circuit	200	$V/\mu\text{s}$	
Maximum Peak Reverse and Off-State Leakage Current at $V_{RRM}$ , $V_{DRM}$	$I_{RM}$	$T_J = T_J \text{ Max}$ , Gate Open Circuit	10	mA	
	$I_{DM}$		2.0	mA	
RMS Isolation Voltage	$V_{INS}$	50Hz, Circuit to Base, All Terminals Shorted	2500	V	

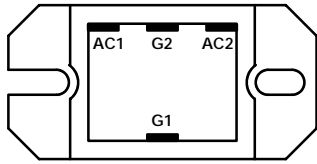
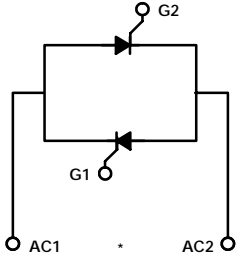
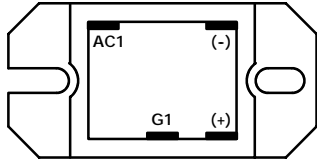
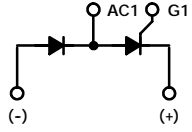
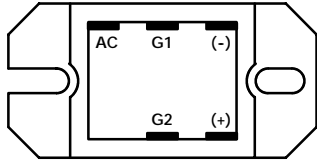
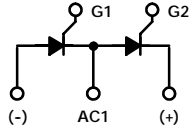
Note 2.  $I^2t$  for time  $t_x = I^2 \sqrt{t} - \sqrt{t_x}$ .

### Pin Connection and Schematic Diagrams:

NTE No.	Description	Terminal Positions	Schematic Diagrams
5700	Single Phase, Hybrid Bridge, Common Cathode, Freewheeling Diode		
5701	Single Phase, Hybrid Bridge, Common Anode, Freewheeling Diode		
5702	Single Phase, All SCR Bridge		

\* For transient protection, a Metal Oxide Varistor (MOV) may be connected externally across terminals AC1 & AC2.

**Pin Connection and Schematic Diagrams (Cont'd):**

NTE No.	Description	Terminal Positions	Schematic Diagrams
5703	SCR AC Switch		
5704	Hybrid Doubler		
5705	SCR Doubler		

\* For transient protection, a Metal Oxide Varistor (MOV) may be connected externally across terminals AC1 & AC2.

