T77P1650S Series

3600 - 4400 V_{RMS}, 1650 A_{AVG}
Standard Recovery Thyristor

Features:

- All Diffused Structure
- Spoke Amplifying Gate Configuration
- Blocking capability up to 4400 Volts
- Guaranteed Maximum Turn-Off Time
- High dV/dt Capability
- Pressure Assembled Device

ELECTRICAL CHARATERISTICS AND RATINGS

Blocking - Off State

Device Type	V_{RRM}(1)	V_{DRM}(1)	V_{RSM}(1)
T77P1650S3600	3600	3600	3700
T77P1650S3800	3800	3800	3900
T77P1650S4000	4000	4000	4100
T77P1650S4200	4200	4200	4300
T77P1650S4300	4300	4300	4400
T77P1650S4400	4400	4400	4500

V_{RRM} = Repetitive peak reverse voltage
V_{DRM} = Repetitive peak off state voltage
V_{RSM} = Non repetitive peak reverse voltage(2)

Repetitive peak reverse leakage and off state leakage	I_{RRM} / I_{DRM}	20 mA 250 mA (3)
Critical rate of voltage rise	dV/dt (4)	1000 V/µsec

Notes:
All ratings are specified for T_J=25°C unless otherwise stated.
(1) All voltage ratings are specified for an applied 50Hz/60zHz sinusoidal waveform over the temperature range -40 to +125°C.
(2) 10 msec. max. pulse width
(3) Maximum value for T_J = 125°C.
(4) Minimum value for linear and exponential waveshape to 70% rated V_{DRM}. Gate open. T_J = 125°C.
(5) Non-repetitive value.
(6) The value of di/dt is established in accordance with EIA/NIMA Standard RS-397, Section 5-2-2-6. The value defined would be in addition to that obtained from a snubber circuit, comprising a 0.2 µF capacitor and 20 ohms resistance in parallel with the thyristor under test.

Conducting - On State

Parameter	Symbol	Min.	Max.	Typ.	Units	Conditions
Average value of on-state current	$I_{T(AV)}$		1650		A	Sinewave,180° conduction, T_C=70°C
RMS value of on-state current	I_{TRMS}		2600		A	Nominal value
Peak one cycle surge (non-repetitive) current	I_{TSM}		26000 24000		A A	8.3 msec (60Hz), sinusoidal wave-shape, 180° conduction, T_J = 125°C 10.0 msec (50Hz), sinusoidal wave-shape, 180° conduction, T_J = 125°C
I square t	I^2t		$2.8x10^6$		A^2s	8.3 msec and 10.0 msec
Latching current	I_L		1000		mA	V_D = 24 V; R_L= 12 ohms
Holding current	I_H		250		mA	V_D = 24 V; I = 2.5 A
Peak on-state voltage	V_{TM}		2.55		V	I_{TM} = 5000 A; Duty cycle ≤ 0.01%

Critical rate of rise of on-state current [5, 6]	di/dt		300		A/µs	Switching from $V_{DRM} \leq 3000$ V, non-repetitive
Critical rate of rise of on-state current [6]	di/dt		100		A/µs	Switching from $V_{DRM} \leq 3000$ V

Gating

Parameter	Symbol	Min.	Max.	Typ.	Units	Conditions
Peak gate power dissipation	P_{GM}		200		W	t_p = 40 us
Average gate power dissipation	$P_{G(AV)}$		5		W	
Peak gate current	I_{GM}		20		A	
Gate current required to trigger all units	I_{GT}		300 200 125		mA mA mA	V_D = 6 V;R_L = 3 ohms; T_J = -40°C V_D = 6 V;R_L = 3 ohms; T_J = +25°C V_D = 6 V;R_L = 3 ohms; T_J = +125°C
Gate voltage required to trigger all units	V_{GT}	0.30	5 4		V V V	V_D = 6 V;R_L = 3 ohms; T_J = -40°C V_D = 6 V;R_L = 3 ohms; T_J = 0-125°C V_D = Rated V_{DRM}; R_L = 1000 ohms; T_J = + 125°C
Peak negative voltage	V_{GRM}		20		V	

Dynamic

Parameter	Symbol	Min.	Max.	Typ.	Units	Conditions
Delay time	t_d		3.0	2.5	µs	I_{TM} = 50 A; V_D = 2000 V Gate pulse: V_G = 20 V; R_G = 20 ohms; t_r = 0.1 µs; t_p = 20 µs
Turn-off time (with V_R = -50 V)	t_q		400	250	µs	I_{TM} > 2000 A; di/dt = 10 A/µs; $V_R \geq$ -50 V; Re-applied dV/dt = 500 V/µs linear to 2000 V; V_G = 0; T_J = 125°C; Duty cycle ≥ 0.01%
Reverse recovery current	I_{rr}		110		A	I_{TM} > 2000 A; di/dt = 10 A/µs; $V_R \geq$ -50 V

THERMAL AND MECHANICAL CHARACTERISTICS AND RATINGS

Parameter	Symbol	Min.	Max.	Typ.	Units	Conditions
Operating temperature	T_J	-40	+125		°C	
Storage temperature	T_{STG}	-40	+150		°C	
Thermal resistance – junction to case	$R_{\Theta (j-c)}$		0.012		°C/W	Double sided cooled Single sided cooled
Thermal resistance – case to sink	$R_{\Theta (c-s)}$		0.002		°C/W	Double sided cooled * Single sided cooled *
Mounting force	P	8000 35.5	10000 44.4		lb. kN	
Weight	W			3.5 1.60	Lb. Kg.	

* Mounting surfaces smooth, flat and greased

CASE OUTLINE AND DIMENSIONS