SILICON POWER

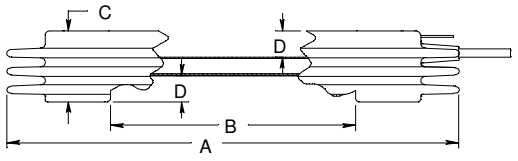
SPT411A
4600A, 5000V
125mm Thyristor

Features
4600A, 5000V
270kA Pulse Current Capability
20kA/µS di/dt Pulse Capability
Low Power Gate Driver

Description
The SPT411A thyristor is optimized for pulse power applications. It features a highly intedigitated cathode / pilot gate combinations which enable extremely high pulse power di/dt driven with low gate power.

The design utilizes a revolutionary "Light Silicon Sandwich" or LSS technology, a new termination technique which eliminates heavy refractory metal as a substrate but still employs the alloyed anode interface necessary for high surge current duty. This light weight plastic package allows the insertion of liquid cooled chillers. Copper inserts can be supplied for adjoining commercially available flat surfaced heat dissipators.

Package
A=162.7mm, B=106.4mm, C=20.12mm, D=7.71mm
Notes - 1, 2 & 3



MODEL RATING AVAILABILITY

PART NUMBER	V_{DRM}	V_{RRM}
SPT411AHT	5000	5000
SPT411AHS	4900	4900
SPT411AHR	4800	4800
SPT411AHP	4700	4700
SPT411AHM	4600	4600

Limiting Characteristics and Ratings
At T_J = 115°C, Unless Otherwise Specified

	SYMBOL		UNITS
Repetitive Peak Off State Voltage	V_{DRM}	5000	V
Repetitive Peak Reverse Voltage	V_{RRM}	5000	V
Average On-State Current (T_C=70°C)	$I_{T(AV)}$	4600	A
Peak Half-Cycle Non-Repetitive Surge Current (8.3ms / 1.5ms)	I_{TSM}	77.5 / 143	kA
Critical Gate Trigger Voltage (V_D = 12V, T_J = 25°C)	V_{GT}	5	V
Critical Gate Trigger Current (V_D = 12V, T_J = 25°C)	I_{GT}	150	mA
Non-Trigger Gate Current (V_D = 2000V)	I_{GD}	15	mA
Non-Trigger Gate Voltage (V_D = 2000V)	V_{GD}	0.8	V
Open Circuit Gate Voltage	V_{OC}	100	V
Short Circuit Gate Current	I_{SS}	20	A
Gate Pulse Duration and Rise Time	10 µs duration / 0.1 µs rise time		
Turn-Off Time (5A/µs, -100V, 20V/µs to 2000V)	Toff	400	µs
Turn-On Delay (V_D = 50%V_{DRM}, T_J =115°C)	td	4	µs
Rate of Change of Voltage (V_D=70% V_{DRM})	dv/dt	1000	V/µs
Rate of Change of Current (V_D=50% V_{DRM}, single shot capability)	di/dt	20	kA/µs
Operating and Storage Temperature	T_J, T_{STG}	0 to +115	°C
Mounting Force	F	25000-30000	lbs

Notes
1. Optional external posts dwg. # 0215B8315; Ni plated copper, 0.35" thick each.
2. Compressed thickness including external post is 0.88" - 0.89" (22.35mm - 22.61mm).
3. Weigh 18 oz., 3.6 lbs with posts.

Electrical Specifications
At T_J = 115°C, Unless Otherwise Specified

PARAMETERS	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNITS
Peak Off State Blocking	I_{DRM}	V_D = 80%V_{DRM}				450	mA
Forward & Reverse Current	I_{RRM}					100	mA
On State Voltage	V_{TM}	I_T = 10kA Pulse	T_C = +30°C		2		V
			T_C = +115°C		2.46		V
Max. Peak Recovery Current	I_{RM}	di/dt = 2A/µs	Snap. S = .5-.33			110	A
		di/dt = 2000A/µs	Snap. S = .5-.33			10000	A
Thermal Resistance	$R_{\theta JC}$	Double Side Cooling			0.0034		°C/W

Typical Performance Curves

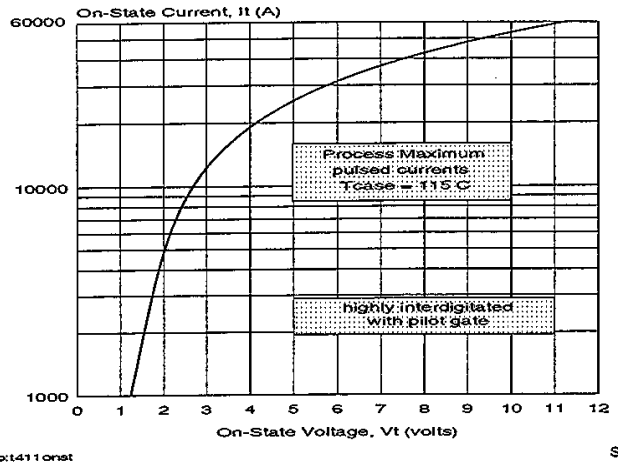


FIGURE 1. ON-STATE CURRENT vs ON STATE VOLTAGE

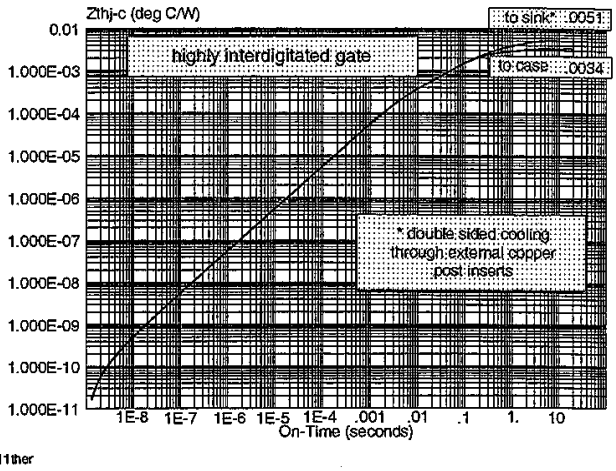


FIGURE 2. THERMAL IMPEDANCE vs ON TIME

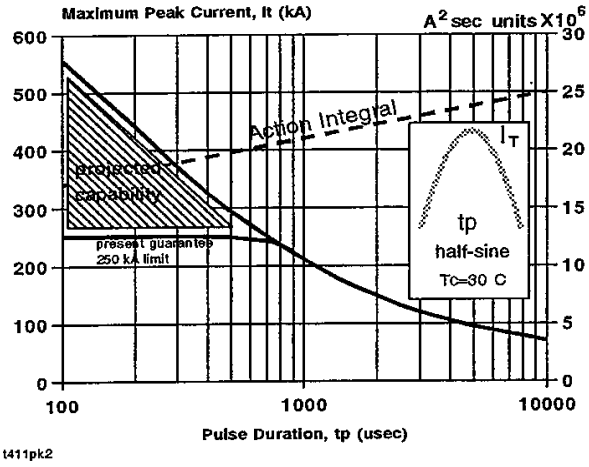


FIGURE 3. SINUSOIDAL, SINGLE SHOT CAPABILITY

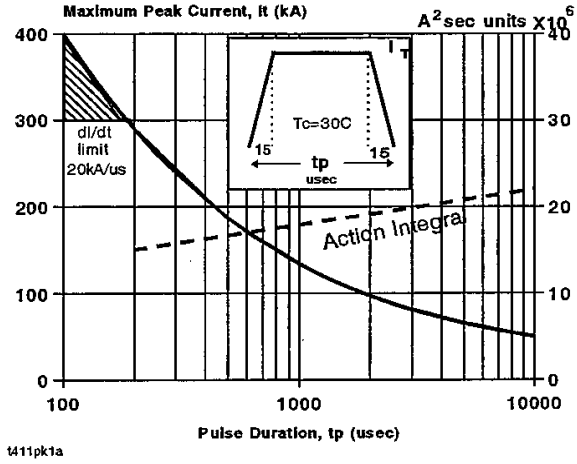


FIGURE 4. TRAPEZOIDAL, SINGLE SHOT CAPABILITY

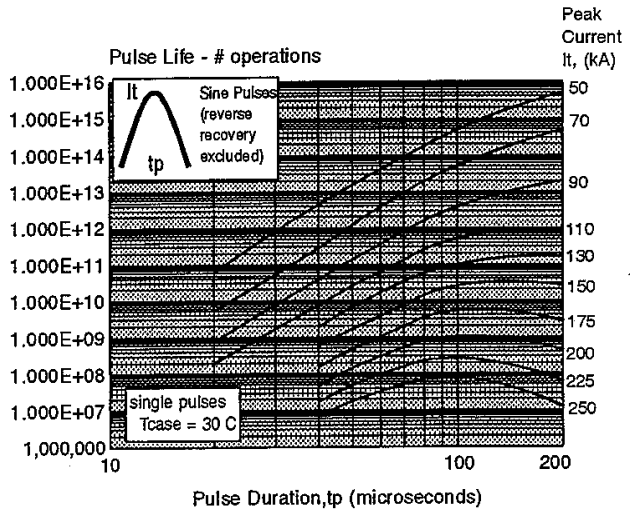


FIGURE 5. SINUSOIDAL, NUMBER OF OPERATIONS

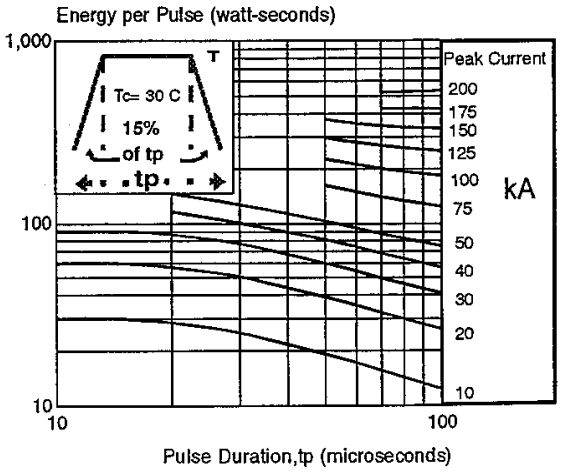
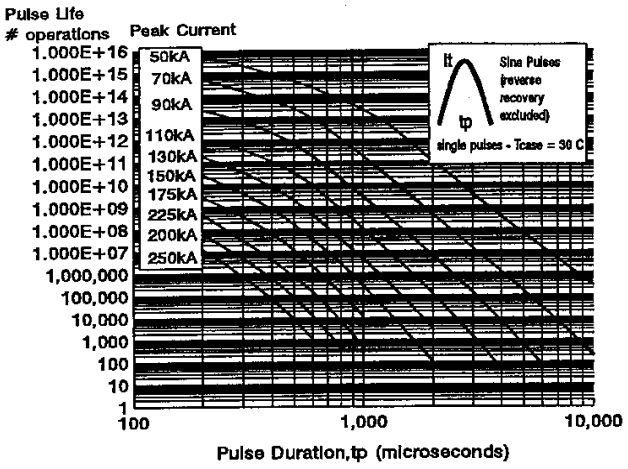


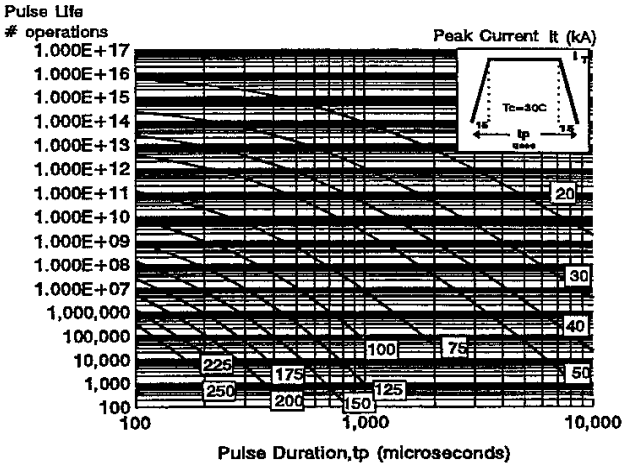
FIGURE 6. TRAPEZOIDAL, NUMBER OF OPERATIONS

Typical Performance Curves



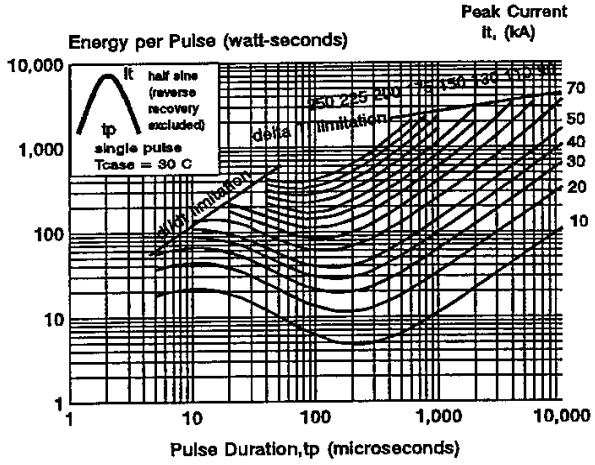
99b:t411dat2

FIGURE 7. SINUSOIDAL, NUMBER OF OPERATIONS



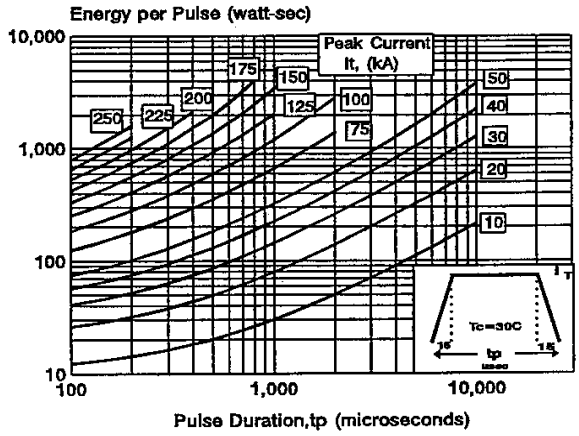
99b:t411dat4

FIGURE 8. TRAPEZOIDAL, NUMBER OF OPERATIONS



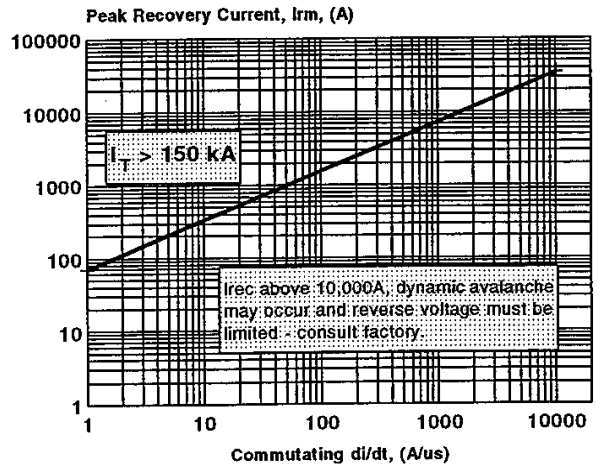
99b:t411dat

FIGURE 9. SINUSOIDAL, ENERGY PER PULSE



99b:t411dat5

FIGURE 10. TRAPEZOIDAL, ENERGY PER PULSE



t411rec1

FIGURE 11. PEAK I_{REC} vs COMMUTATING di/dt