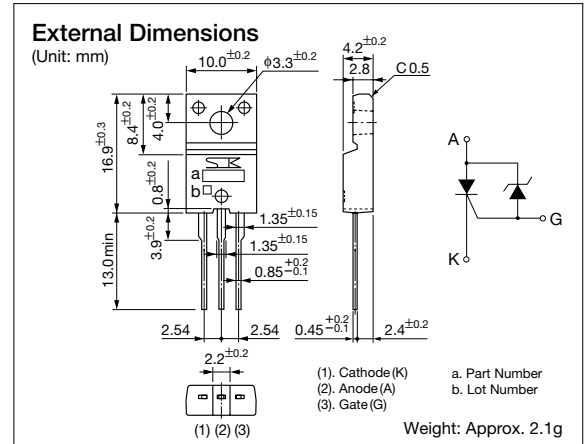


TO-220F 3A Thyristor with built-in Avalanche diode

TFD312S series

■ Features

- With built-in Avalanche diode
- Average on-state current: $I_{T(AV)}=3A$
- Gate trigger current: $I_{GT}=10mA$ max
- Isolation voltage: $V_{ISO}=1500V(50Hz AC, RMS, 1min.)$



■ Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit	Conditions
Repetitive peak off-state voltage	V_{DRM}	*	V	$T_j = -10$ to $+125^\circ C$, $R_{GK} = 1k\Omega$
Average on-state current	$I_{T(AV)}$	3.0	A	50Hz Half-cycle sinewave, 180° , Continuous current, $T_c = 92^\circ C$
RMS on-state current	$I_T(RMS)$	4.7	A	
Surge on-state current	I_{TSM}	60	A	50Hz Half-cycle sinewave, Peak value, Non-repetitive, $T_j = 125^\circ C$
Squared rated current and time product	I^2t	18	$A^2 \cdot sec$	$2ms \leq t \leq 10ms$
Peak forward gate voltage	V_{FGM}	1.5	V	$f \geq 50Hz$, duty $\leq 10\%$
Peak reverse gate voltage	V_{RGM}	5.0	V	$f \geq 50Hz$
Peak gate power loss	P_{GM}	5.0	W	$f \geq 50Hz$, duty $\leq 10\%$
Average gate power loss	$P_{G(AV)}$	0.5	W	
Junction temperature	T_j	-10 to $+125$	$^\circ C$	
Storage temperature	T_{stg}	-40 to $+125$	$^\circ C$	
Isolation voltage	V_{ISO}	1500	V	50Hz Sine wave, RMS, Terminal to case, 1min.

* V_{DRM}

Rank	-C	-F	-G	-J	-K	-L	-M	-N	-O
Ratings	20	35	45	80	100	120	145	170	190

■ Electrical Characteristics

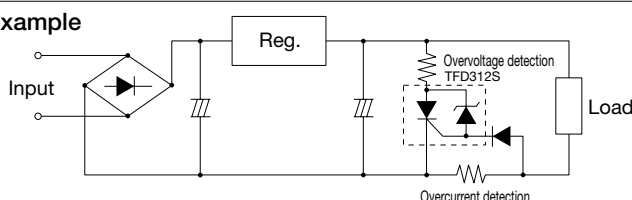
($T_j = 25^\circ C$, unless otherwise specified)

Parameter	Symbol	Ratings			Unit	Conditions
		min	typ	max		
Off-state current	I_{DRM}			1.0	mA	$T_j = 125^\circ C$, $V_D = V_{DRM}$, $R_{GK} = 1k\Omega$
				100	μA	$T_j = 25^\circ C$, $V_D = V_{DRM}$, $R_{GK} = 1k\Omega$
Breakover voltage	V_{BO}		*		V	
Breakover current	I_{BO}	0.2		15	mA	
On-state voltage	V_{TM}			1.4	V	$I_{TM} = 5A$
Gate trigger voltage	V_{GT}			1.0	V	$V_D = 6V$, $R_L = 10\Omega$
Gate trigger current	I_{GT}	0.2		10	mA	
Gate non-trigger voltage	V_{GT}	0.1			V	$V_D = V_{DRM}$, $T_j = 125^\circ C$, $R_{GK} = 1k\Omega$
Holding current	I_H			15	mA	$R_{GK} = 1k\Omega$, $T_j = 125^\circ C$
Critical rate-of-rise of off-state voltage	dv/dt		40		$V/\mu S$	$V_D = V_{DRM}$, $T_j = 125^\circ C$, $R_{GK} = 1k\Omega$, $C_{GK} = 0.033\mu F$
Thermal resistance	R_{th}			5.0	$^\circ C/W$	Junction to case

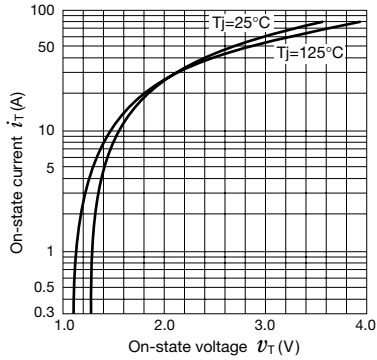
* V_{BO}

Ratings	Rank	-C	-F	-G	-J	-K	-L	-M	-N	-O
	min	27	50	60	90	115	140	163	185	210
	typ	30	55	65	100	125	150	175	200	225
max	33	60	70	110	135	160	187	215	240	

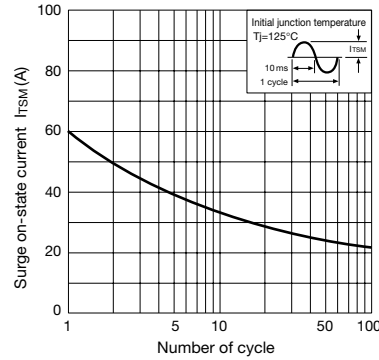
Application example



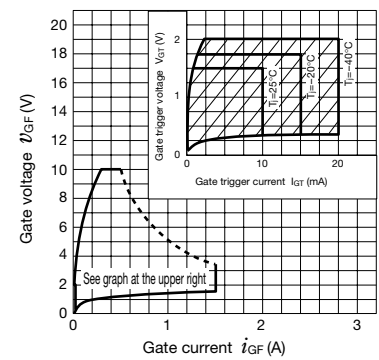
$V_T - I_T$ Characteristics (max)



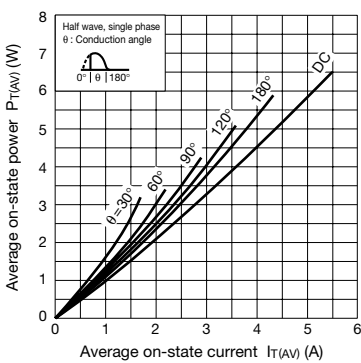
I_{TSM} Ratings



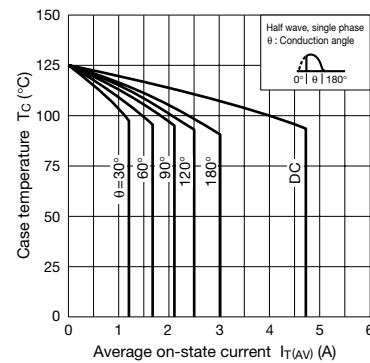
Gate Characteristics



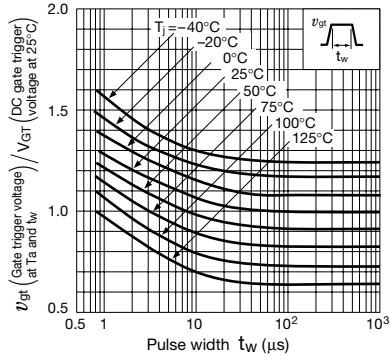
$I_T(AV) - P_T(AV)$ Characteristics



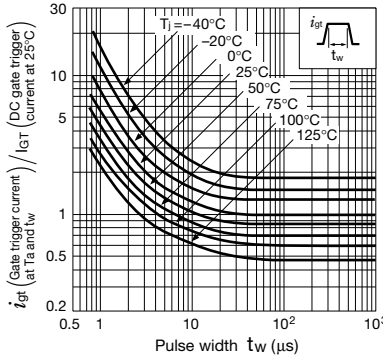
$I_T(AV) - T_c$ Ratings



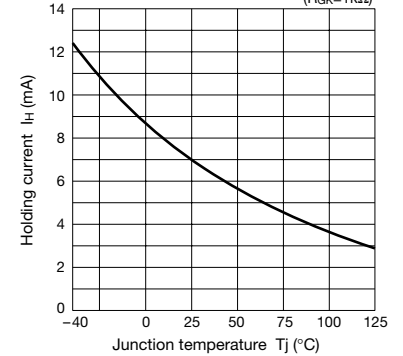
Pulse trigger temperature Characteristics V_{gt} (Typical)



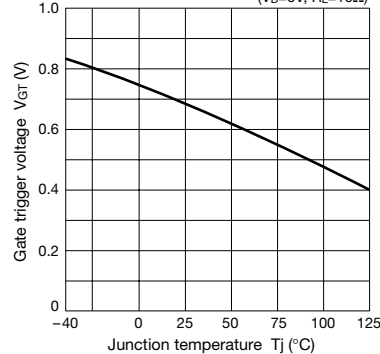
Pulse trigger temperature Characteristics i_{gt} (Typical)



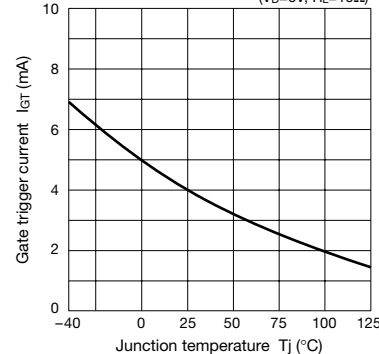
I_H temperature Characteristics (Typical)



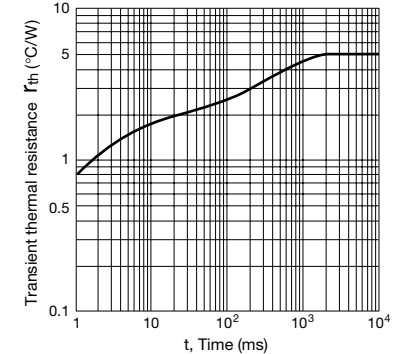
V_{GT} temperature Characteristics (Typical)



I_{GT} temperature Characteristics (Typical)



Transient thermal resistance Characteristics (Junction to case)



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