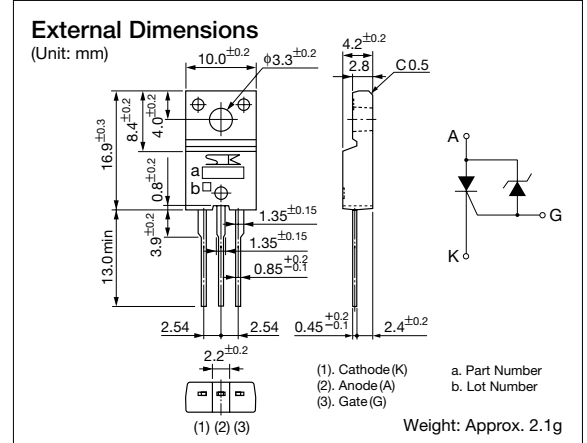


# TO-220F 3A Thyristor with built-in Avalanche diode

## 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, $180^\circ$ , 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

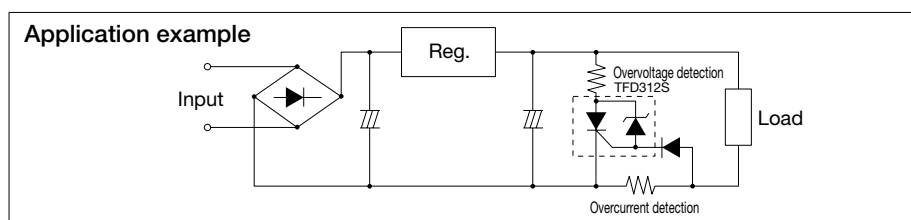
### ■ Electrical Characteristics

( $T_j=25^\circ C$ , 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	$\mu A$	$T_j=25^\circ C$ , $V_D=V_{DRM}$ , $R_{GK}=1k\Omega$
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

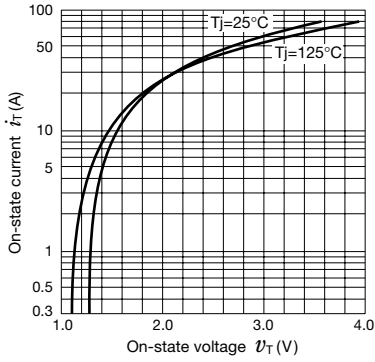
\* $V_{BO}$

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

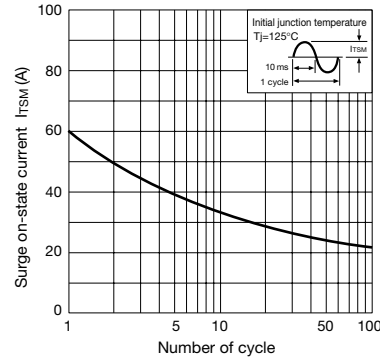


# TFD312S series

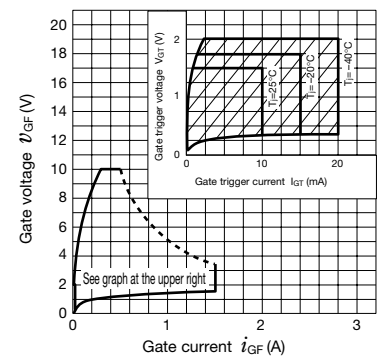
$V_T - I_T$  Characteristics (max)



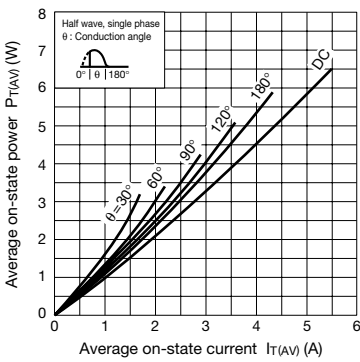
$I_{TSM}$  Ratings



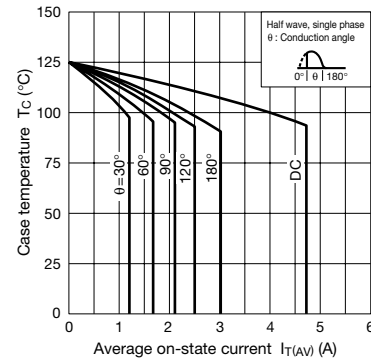
Gate Characteristics



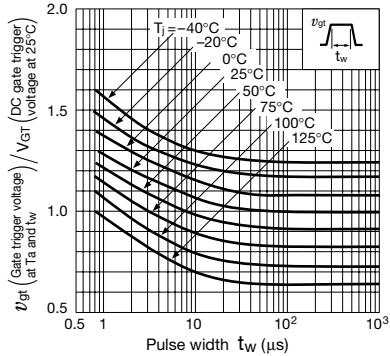
$I_T(AV) - P_T(AV)$  Characteristics



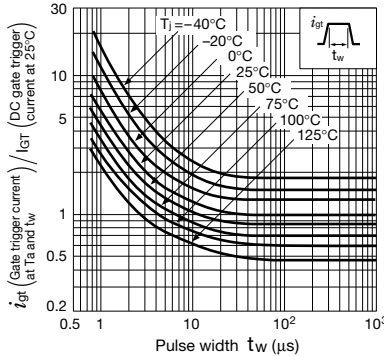
$I_T(AV) - T_c$  Ratings



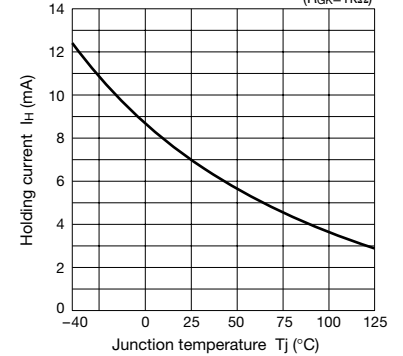
Pulse trigger temperature Characteristics  $V_{gt}$  (Typical)



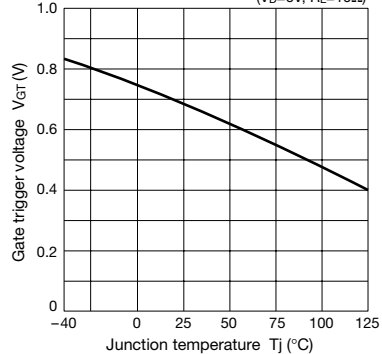
Pulse trigger temperature Characteristics  $I_{gt}$  (Typical)



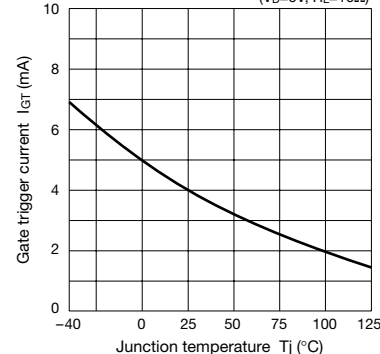
$I_H$  temperature Characteristics (Typical)



$V_{GT}$  temperature Characteristics (Typical)



$I_{GT}$  temperature Characteristics (Typical)



Transient thermal resistance Characteristics (Junction to case)

