

3875081 G E SOLID STATE

01E 17669 D T-25-13
Silicon Controlled Rectifiers

File Number 114

2N3228, 2N3525, 2N4101

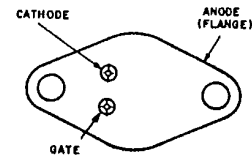
5-A Silicon Controlled Rectifiers

For Low-Cost Power-Control and Power-Switching Applications

Features

- High di/dt and dv/dt capabilities
- Low leakage currents, both forward and reverse
- Low forward voltage drop at high current levels
- Low thermal resistance

TERMINAL DESIGNATIONS



JEDEC TO-213AA

RCA 2N3228*, 2N3525*, and 2N4101* are all-diffused, three-junction, silicon controlled rectifiers (SCR's) intended for use in power-control and power-switching applications.

Types 2N3228, 2N3525, and 2N4101 use the JEDEC TO-66 package and have a blocking voltage capability of up to 600 volts and a forward current rating of 5 amperes (rms value) at a case temperature of 75°C.

*Formerly Dev. Types TA1222, TA1225, and TA2773, respectively.

ABSOLUTE-MAXIMUM RATINGS, for Operation with Sinusoidal AC Supply Voltage at a Frequency between 50 and 400 Hz, and with Resistive or Inductive Load.

	2N3228	2N3525	2N4101	
Transient Peak Reverse Voltage (Non-Repetitive), V_{RM} (non-rep)	330	660	700	V
Peak Reverse Voltage (Repetitive), V_{RM} (rep)	200	400	600	V
Peak Forward Blocking Voltage (Repetitive), V_{FBOM} (rep)	200	400	600	V
Forward Current: For case temperature (T_C) of +75°C, and unit mounted on heat sink				
Average DC value at a conduction angle of 180°, I_{FAV}	3.2	3.2	3.2	A
RMS value, I_{FRMS}	5.0	5.0	5.0	A
For free-air temperature (T_{FA}) of 25°C, and with no heat sink employed—				
Average DC value at a conduction angle of 180°, I_{FAV}	1.7	1.7	1.7	A
For other conditions, See Fig. 2				
Peak Surge Current, I_{FM} (surge): For one cycle of applied principal voltage.				
60 Hz (sinusoidal), $T_C = 75^\circ\text{C}$		60		A
50 Hz (sinusoidal), $T_C = 75^\circ\text{C}$		50		A
For more than one cycle of applied voltage, See Fig. 5				
Fusing Current (for SCR protection):				
$T_J = -40$ to 100°C , $t = 1$ to 8.3 ns, i^2t		15		A ² s
Rate of Change of Forward Current, di/dt		200*		A/ μ s
$I_{GT} = 200$ mA, 0.5 μ s rise time				
Gate Power*: Peak, Forward or Reverse, for 10 μ s duration, P_{GM}		13		W
Average, P_{GAV}		0.5		W
Temperature:				
Storage, T_{stg}		-40 to +125		°C
Operating (Case), T_C		-40 to +100		°C

*Any values of peak gate current or peak gate voltage to give the maximum gate power is permissible.

3875081 G E SOLID STATE
Silicon Controlled Rectifiers

01E 17670 D T-25-13

2N3228, 2N3525, 2N4101

Characteristics at Maximum Ratings (unless otherwise specified), and at Indicated Case Temperature (T_C)

CHARACTERISTICS	CONTROLLED-RECTIFIER TYPES									UNITS
	2N3228			2N3525			2N4101			
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
Forward Breakover Voltage, V_{BO} : At $T_C = +100^{\circ}\text{C}$	200	—	—	400	—	—	600	—	—	volts
Peak Blocking Current, at $T_C = +100^{\circ}\text{C}$:										
Forward, I_{FBOM}	—	0.10	1.5	—	0.20	3.0	—	0.40	4.0	mA
$V_{FB0} = V_{BO}$ (min. value)	—	0.05	0.75	—	0.10	1.5	—	0.20	2.0	mA
Reverse, I_{RBOM}	—	0.05	0.75	—	0.10	1.5	—	0.20	2.0	mA
$V_{RB0} = V_{RM}$ (rep) value	—	0.05	0.75	—	0.10	1.5	—	0.20	2.0	mA
Forward Voltage Drop, V_F At a Forward Current of 30 amperes and a $T_C = +25^{\circ}\text{C}$	—	2.15	2.8	—	2.15	2.8	—	2.15	2.8	volts
DC Gate-Trigger Current, I_{GT} At $T_C = +25^{\circ}\text{C}$	—	8	15	—	8	15	—	8	15	mA(dc)
Gate-Trigger Voltage, V_{GT} At $T_C = +25^{\circ}\text{C}$	—	1.2	2.0	—	1.2	2.0	—	1.2	2.0	volts(dc)
Holding Current, I_{H00} At $T_C = +25^{\circ}\text{C}$	—	10	20	—	10	20	—	10	20	mA
Critical Rate of Applied Forward Voltage, Critical dv/dt	10	200	—	10	200	—	10	200	—	volts/ microsecond
$V_{FB} = V_{BO}$ (min. value), exponential rise, $T_C = +100^{\circ}\text{C}$	—	0.75	1.5	—	0.75	1.5	—	0.75	1.5	microseconds
Turn-On Time, t_{on} , (Delay Time + Rise Time) $V_{FB} = V_{BO}$ (min. value), $i_F = 4.5$ amperes, $I_{GT} = 200\text{mA}$, $0.1\mu\text{s}$ rise time, $T_C = +25^{\circ}\text{C}$	—	0.75	1.5	—	0.75	1.5	—	0.75	1.5	microseconds
Turn-Off Time, t_{off} : $i_F = 2$ amperes, $50\mu\text{s}$ pulse width, $dv_{FB}/dt = 20\text{V}/\mu\text{s}$, $di_F/dt = 30\text{A}/\mu\text{s}$, $I_{GT} = 200\text{mA}$, $T_C = +75^{\circ}\text{C}$	—	15	50	—	15	50	—	15	50	microseconds
Thermal Resistance Junction-to-case	—	—	4	—	—	4	—	—	4	$^{\circ}\text{C}/\text{W}$
Junction-to-ambient	—	—	40	—	—	40	—	—	40	

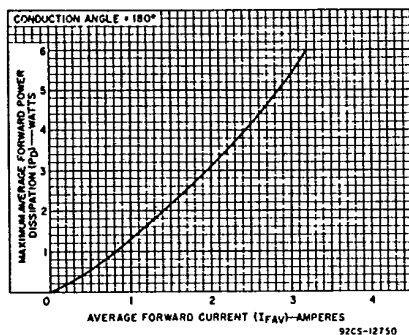


Fig. 1 — Power dissipation chart for all types.

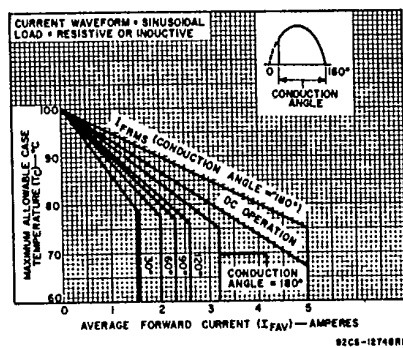


Fig. 2 — Rating chart (case temperature).

3875081 G E SOLID STATE

01E 17671 D T-25-13
Silicon Controlled Rectifiers

2N3228, 2N3525, 2N4101

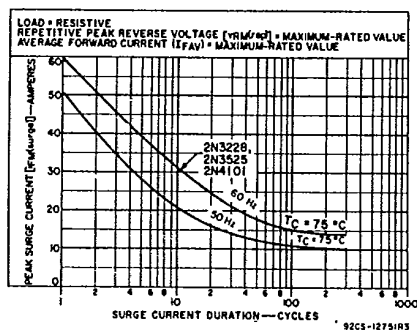


Fig. 3 — Surge-current rating chart.

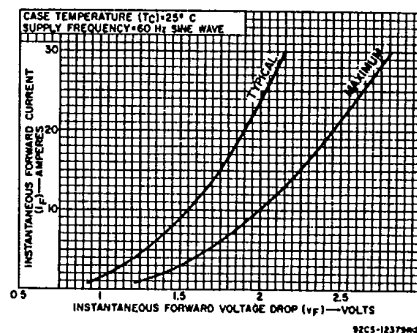


Fig. 4 — Forward characteristics for all types.

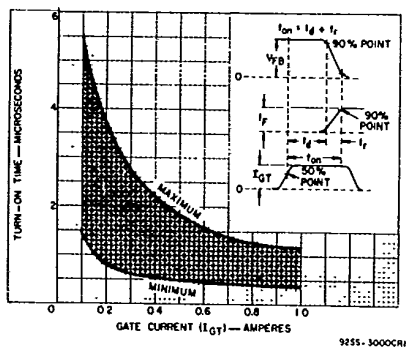


Fig. 5 — Turn-on time characteristics.

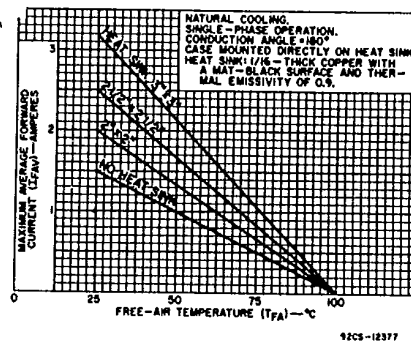


Fig. 6 — Operation guidance chart for types 2N3228, 2N3525, and 2N4101.