File Number 114

2N3228, 2N3525, 2N4101

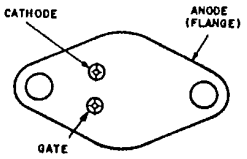
5-A Silicon Controlled Rectifiers

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°C		60		A
50 Hz (sinusoidal), T_C = 75°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^2s
Rate of Change of Forward Current, di/dt		200*		A/μs
I_{GT} = 200 mA, 0.5 μs rise time				
Gate Power*: Peak, Forward or Reverse, for 10 μs 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.

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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_{BOO}: At T_C = +100°C	200	—	—	400	—	—	600	—	—	volts
Peak Blocking Current, at T_C = +100°C: Forward, I_{FBOM}	—	0.10	1.5	—	0.20	3.0	—	0.40	4.0	mA
V_{FBO} = v_{BOO} (min. value) Reverse, I_{RBOM}	—	0.05	0.75	—	0.10	1.5	—	0.20	2.0	mA
V_{RBO} = v_{RM} (rep) value Forward Voltage Drop, v_F At a Forward Current of 30 amperes and a T_C = +25°C	—	2.15	2.8	—	2.15	2.8	—	2.15	2.8	volts
DC Gate-Trigger Current, I_{GT} At T_C = +25°C	—	8	15	—	8	15	—	8	15	mA(dc)
Gate-Trigger Voltage, V_{GT} At T_C = +25°C	—	1.2	2.0	—	1.2	2.0	—	1.2	2.0	volts(dc)
Holding Current, i_{HOO} At T_C = +25°C	—	10	20	—	10	20	—	10	20	mA
Critical Rate of Applied Forward Voltage, Critical dv/dt V_{FB} = v_{BOO} (min. value), exponential rise, T_C = +100°C	10	200	—	10	200	—	10	200	—	volts/ microsecond
Turn-On Time, t_{on}, (Delay Time + Rise Time) V_{FB} = v_{BOO} (min. value), i_F = 4.5 amperes, I_{GT} = 200mA, 0.1 μs rise time, T_C = +25°C	0.75	1.5	—	0.75	1.5	—	0.75	1.5	—	microseconds
Turn-Off Time, t_{off} i_F = 2 amperes, 50 μs pulse width, dv_{FB}/dt = 20v/μs, di_t/dt = 30A/μs, I_{GT} = 200mA, T_C = +75°C	—	15	50	—	15	50	—	15	50	microseconds
Thermal Resistance: Junction-to-case	—	—	4	—	—	4	—	—	4	°C/W
Junction-to-ambient	—	—	40	—	—	40	—	—	40	

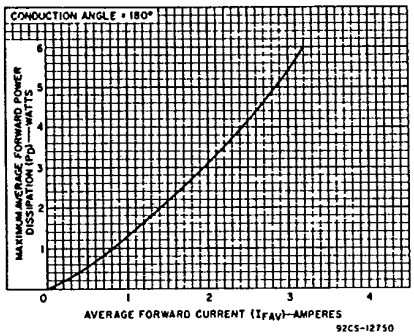

Fig. 1 — Power dissipation chart for all types.

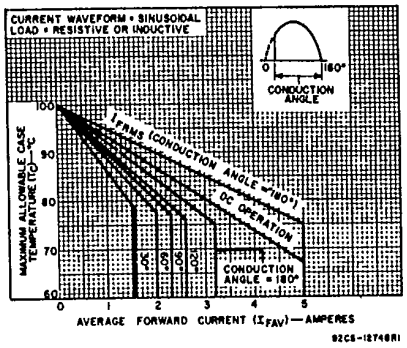

Fig. 2 — Rating chart (case temperature).

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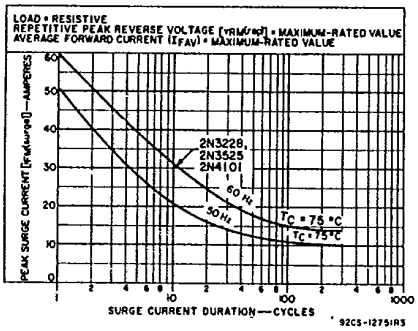

Fig. 3 — Surge-current rating chart.

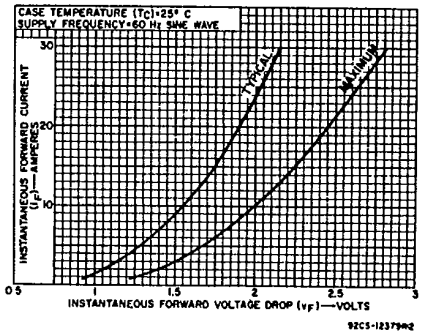

Fig. 4 — Forward characteristics for all types.

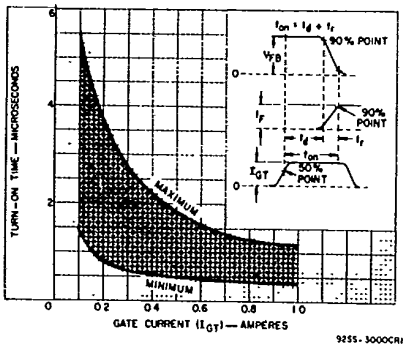

Fig. 5 — Turn-on time characteristics.

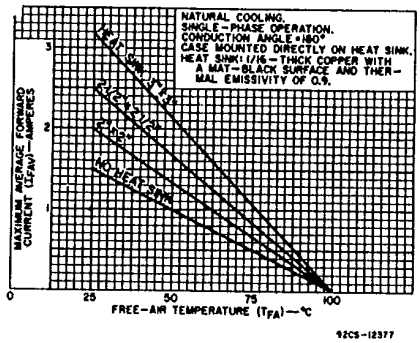

Fig. 6 — Operation guidance chart for types 2N3228, 2N3525, and 2N4101.