

2N681 & 2N5204 SERIES

25 and 35 Amp RMS SCRs

Major Ratings and Characteristics

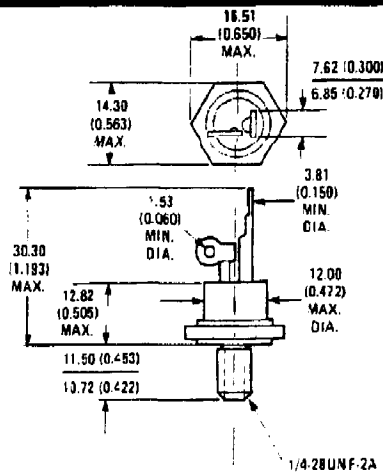
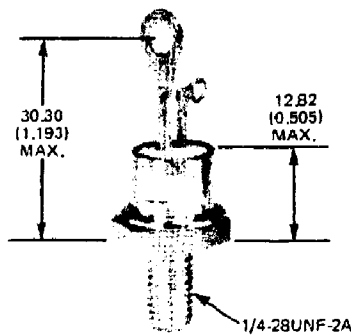
	2N681-92	2N5204-07	Units
$I_T(\text{RMS})$	25	35	A
$I_T(\text{AV})$	16*	22*	A
θ_{TC}	-65 to 65*	-40 to 40	°C
I_{TSM}			
@ 50 Hz	145	285	A
@ 60 Hz	150*	300*	
i_{2t}			A ² s
@ 50 Hz	103	410	
@ 60 Hz	94	375	
I_{GT}	40	40	mA
dv/dt	-	100*	V/ μ s
di/dt	75-100	100	A/ μ s
T_J	-85 to 125*	-40 to 125*	°C
VRRM, VDRM range	25-800	600-1200	V

*JEDEC registered value.

Description/Features

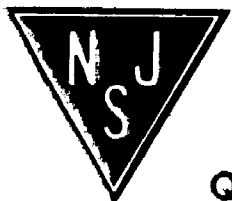
- General purpose stud mounted
- Broad forward and reverse voltage range – through 1200 volts
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements

CASE STYLE AND DIMENSIONS



Conforms to JEDEC Outline [TO-48]
 Dimensions in Millimeters and (Inches)

NJ Semi-Conductors reserves the right to change test conditions, parameters limits and package dimensions without notice information furnished by NJ Semi-Conductors is believed to be both accurate and reliable at the time of going to press. However NJ Semi-Conductors assumes no responsibility for any errors or omissions discovered in its use. NJ Semi-Conductors encourages customers to verify that datasheets are current before placing orders.



2N681 & 2N5204 Series

VOLTAGE RATINGS (Applied gate voltage zero or negative)

Part Numbers	$V_{RRM}, V_{DRM} -$ Max. Repetitive Peak Reverse and Off-State Voltage (V)	V_{RSM} Max. Non Repetitive Peak Reverse Voltage $t_p \leq 5$ ms (V)
	$T_J = -85^\circ\text{C}$ to 125°C	$T_J = -85^\circ\text{C}$ to 125°C
2N681	25*	36*
2N682	50*	75*
2N683	100*	150*
2N685	200*	300*
2N687	300*	400*
2N688	400*	500*
2N689	500*	600*
2N690	800*	720*
2N691	700*	840*
2N692	800*	960*
	$T_J = -40^\circ\text{C}$ to 125°C	$T_J = -40^\circ\text{C}$ to 125°C
2N5204	800	720
2N5205	800	960
2N5206	1000	1200
2N5207	1200	1440

ELECTRICAL SPECIFICATIONS

		2N681-92	2N5204-07	Units	Conditions
ON-STATE					
$I_T(\text{RMS})$	Max. RMS on-state current	25	35	A	
$I_T(\text{AV})$	Max. average on-state current	16*	22*	A	180° half sine wave conduction
	@ $T_C =$	-65 to 65°	-40 to 40°	°C	
I_{TSM}	Max. peak one cycle, non-repetitive surge current	145	285	A	50 Hz half cycle sine wave or 6 ms rectangular pulse
		150*	300*		60 Hz half cycle sine wave or 5 ms rectangular pulse
		170	340		50 Hz half cycle sine wave or 6 ms rectangular pulse
		180	355		60 Hz half cycle sine wave or 5 ms rectangular pulse
i^2t	Max. i^2t capability, for fusing	103	410	A^2s	$t = 10$ ms Rated V_{RRM} applied following surge, initial $T_J = 125^\circ\text{C}$
		94	375		
i^2t	Max. i^2t capability, for individual device fusing	145	580	A^2s	$V_{RRM} = 0$ following surge, initial $T_J = 125^\circ\text{C}$.
		135	530		
$i^2\sqrt{t}$	Max. $i^2\sqrt{t}$ capability, for individual device fusing (1)	1480	5800	$A^2\sqrt{s}$	$t = 0.1$ to 10 ms initial $T_J \leq 125^\circ\text{C}$ V_{RRM} following surge = 0.
V_{TM}	Max. peak on-state voltage	2*	2.3*	V	$T_J = 25^\circ\text{C}$, $I_T(\text{AV}) = 16$ A (50A peak) 2N681, $I_T(\text{AV}) = 22$ A (70A peak) 2N5204
I_H	Max. holding current	20 @ 25°C †	200* @ -40°C	mA	Anode supply = 24V, initial $I_T = 1.0$ A.
BLOCKING					
dv/dt	Min. critical rate-of-rise of off-state voltage	100†	100*	V/ μ s	$T_J = 125^\circ\text{C}$. Exponential to 100% rated V_{DRM}
		250†	250		$T_J = 125^\circ\text{C}$. Exponential to 87% rated V_{DRM}

*JEDEC Registered value.

(1) i^2t for time $t_x = i^2\sqrt{t} = \sqrt{t_x}$.

† Typical

2N681 & 2N5204 Series

ELECTRICAL SPECIFICATIONS (Continued)

		2N681-92	2N5204-07	Units	Conditions
BLOCKING (Continued)					
$I_{R(-)}$ & $I_{D(-)}$ Max. reverse and off-state current V_{RRM} & V_{DRM} = 5V		$I_{R(AV)}$ & $I_{D(AV)}$ (Average Values)	I_{RM} & I_{DM} (Peak Values)	mA	$T_J = 125^\circ\text{C}$, gate open circuited.
	25 to 150V	6.5*	-		
	200 & 250V	6.0*	-		
	300V	5.0*	-		
	400V	4.0*	-		
	500V	3.0*	-		
	600V	2.5*	3.3*		
	700V	2.25*	-		
	800V	2.0*	2.5*		
	1000V	-	2.0*		
	1200V	-	1.7*		
SWITCHING					
t_d	Typical delay time	1	1	μs	$T_C = 25^\circ\text{C}$, $V_{DM} = \text{rated } V_{DRM}$, $I_{TM} = 10\text{A}$ dc resistive circuit. Gate pulse: 10V, 40 Ω source, $t_p = 6 \mu\text{s}$, $t_r = 0.1 \mu\text{s}$.
di/dt	Max. non-repetitive rate of rise of turned-on current $V_{DM} = 25$ to 600V	100	-	A/ μs	$T_C = 125^\circ\text{C}$, $V_{DM} = \text{rated } V_{DRM}$, $I_{TM} = 2 \times \text{div.}$ Gate pulse: 20V, 15 Ω , $t_p = 6 \mu\text{s}$, $t_r = 0.1 \mu\text{s}$ max. Per JEDEC standard RS-397, 5.2.2.6.
		= 700 to 800V	75		
		-	100		$T_C = 125^\circ\text{C}$, $V_{DM} = 600\text{V}$, $I_{TM} = 200\text{A}$ @ 400 Hz. max., Gate pulse: 20V, 15 Ω , $t_p = 6 \mu\text{s}$, $t_r = 0.1 \mu\text{s}$ max. Per JEDEC standard RS-397, 5.2.2.6.
TRIGGERING					
PGM	Max. peak gate power	5*	80*	W	$t_p \leq 5 \text{ms}$ for 2N681 series; $t_p \leq 500 \mu\text{s}$ for 2N5204 series.
$P_{G(AV)}$	Max. average gate power	3.5*	0.5*	W	
$+I_{GM}$	Max. peak positive gate current	2*	2	A	
$+V_{GM}$	Max. peak positive gate voltage	10*	-	V	
$-V_{GM}$	Max. peak negative gate voltage	5*	5*	V	
I_{GT}	Max. required DC gate current to trigger	80*	80*	mA	$T_C = \text{min. rated value. Max. required gate trigger current is the lowest value which will trigger all units with +6V anode-to-cathode.}$ $T_C = 25^\circ\text{C}$ $T_C = 125^\circ\text{C}$
		40	40		
		18.5	20		
	Typical DC gate current to trigger	30	30		$T_C = 25^\circ\text{C}$ +6V anode-to-cathode
V_{GT}	Max. required DC gate voltage to trigger	3*	3*	V	$T_C = -65^\circ\text{C}$. Max. required gate trigger voltage is the lowest value which will trigger all units with +6V anode-to-cathode. $T_C = 25^\circ\text{C}$ $T_C = 25^\circ\text{C}$ +6V anode-to-cathode
		2	2		
		1.5	1.5		
	Typical DC gate voltage to trigger	1.5	1.5		$T_C = 25^\circ\text{C}$ +6V anode-to-cathode
V_{GD}	Max. DC gate voltage not to trigger	0.25*	0.25*	V	$T_C = 125^\circ\text{C}$. Max. gate voltage not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode-to-cathode.