

251UL SERIES

250 Amp Fast Recovery Power Silicon Rectifiers

Major Ratings and Characteristics

	251ULRXXS10 251ULXXS10	251ULRXXS15 251ULXXS15	251ULRXXS20 251ULXXS20	251ULRXXS25 251ULXXS25	Units
$I_F(AV)$	250	250	250	250	A
@ Max. T_C	55 ①	105 ②	105 ②	105 ②	$^{\circ}C$
I_{FSM} @ 50 Hz	3,350	3,350	3,350	3,350	A
@ 60 Hz	3,500	3,500	3,500	3,500	
I^2t @ 50 Hz	56,000	56,000	56,000	56,000	A^2s
@ 60 Hz	51,000	51,000	51,000	51,000	
$i^2\sqrt{t}$	790,000	790,000	790,000	790,000	$A^2\sqrt{s}$
t_{rr}	1	1.5	2	2.5	μs
V_{RRM} Range	200 to 1,000	200 to 1,000	600 to 1,400	1,400 to 1,800	V

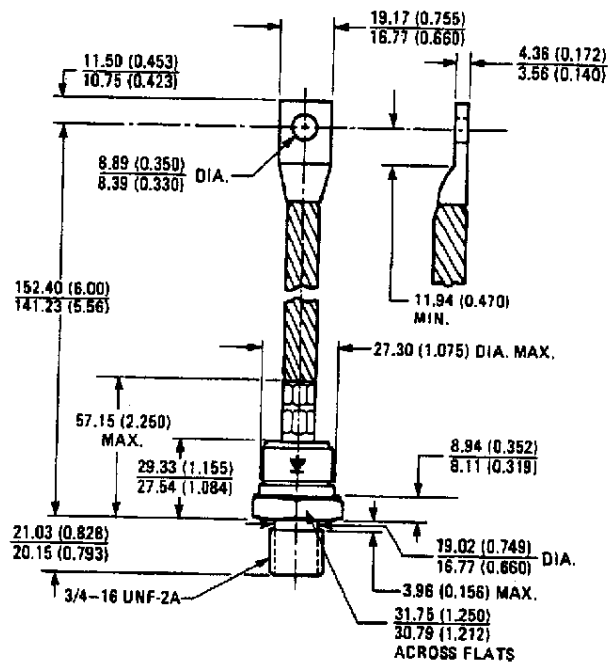
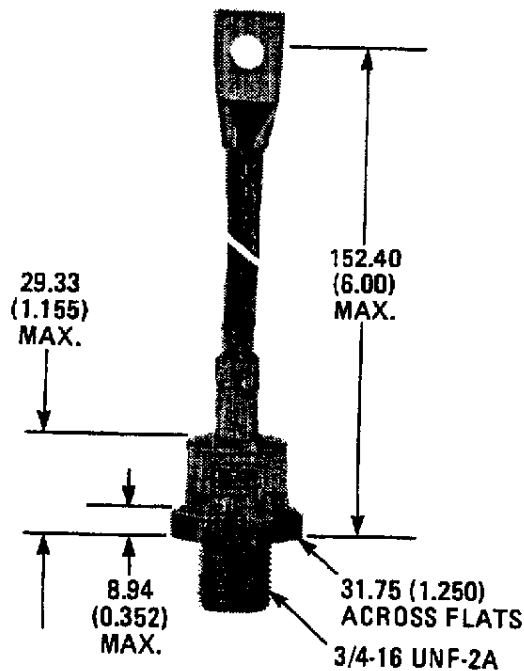
① Max. T_C for 251ULRXXS10 is 70 $^{\circ}C$.

② Max. T_C for 251ULRXXS15 to S25 is 120 $^{\circ}C$.

Description/Features

- $t_{rr} = 1.0 \mu s @ 200 \text{ to } 1000V$
 $= 1.5 \mu s @ 200 \text{ to } 1000V$
 $= 2.0 \mu s @ 600 \text{ to } 1400V$
 $= 2.5 \mu s @ 1000 \text{ to } 1800V$
- For — by-pass diodes (free-wheeling diodes)
 — inverters and choppers
 — up to 10 kHz
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements.

CASE STYLE AND DIMENSIONS



Conforms to JEDEC
 Outline DD-205AB (DO-9) (B-8)
 All Dimensions in Millimeters and (Inches)

VOLTAGE RATINGS

Part Number				V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) ^①	V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) ^①	V_{RSM} - Max. Non-Repetitive Peak Reverse Voltage $t_p \leq 5$ ms (V) ^①	V_R - Max. Direct Reverse Voltage (V) ^①
1.0 μ s	1.5 μ s	2.0 μ s	2.5 μ s	$T_J = -40^\circ\text{C}$ to 175°C	$T_J = 0^\circ\text{C}$ to 175°C	$T_J = 25^\circ\text{C}$ to 175°C	$T_J = -40^\circ\text{C}$ to 175°C
251UL20S10	251UL20S15	—	—	200	200	300	200
251UL40S10	251UL40S15	—	—	400	400	500	400
251UL60S10	251UL60S15	251UL60S20	—	600	600	720	600
251UL80S10	251UL80S15	251UL80S20	—	800	800	960	800
251UL100S10	251UL100S15	251UL100S20	251UL100S25	1000	1000	1200	1000
—	—	251UL120S20	251UL120S25	1200	1200	1400	1200
—	—	251UL140S20	251UL140S25	1400	1500	1600	1400
—	—	—	251UL160S25	1600	1700	1800	1600
—	—	—	251UL180S25	1800	1900	2000	1800

REVERSE RECOVERY CHARACTERISTICS

		251UL/251ULR				Units	Conditions for Reverse Recovery
		S10	S15	S20	S25		
t_{rr}	Max. reverse recovery time ^②	1.0	1.5	2.0	2.5	μ s	$I_{FM} = 785\text{A}$, $t_p \approx 100 \mu\text{s}$, $di/dt = -25 \text{A}/\mu\text{s}$, $T_C = 25^\circ\text{C}$
t_a	Max. reverse recovery rise time	0.75	1.13	1.50	1.88	μ s	
t_b	Min. reverse recovery fall time	0.25	0.37	0.50	0.62	μ s	
$I_{RM(REC)}$	Max. reverse recovery current	20	30	38	44	A	
Q_{RR}	Max. recovered charge	10	20.5	38	55	μC	
Voltage Range		200 to 1,000	200 to 1,000	600 to 1,400	1,000 to 1,800	V	

ELECTRICAL SPECIFICATIONS

		251ULXXS10	251ULRXXS10	251ULXXS15 thru 251ULXXS25	251ULRXXS15 thru 251ULRXXS25	Units	Conditions
$I_{F(AV)}$	Max. average forward current	250	250	250	250	A	180° sinusoidal conduction.
	@ Max. $T_C =$	55	70	105	120	$^\circ\text{C}$	
I_{FSM}	Max. peak one cycle, non-repetitive surge current	3,350	3,350	3,350	3,350	A	50 Hz half cycle sine wave or 6 ms rectangular pulse Following any rated load condition, and with rated V_{RRM} applied following surge.
		3,500	3,500	3,500	3,500		60 Hz half cycle sine wave or 5 ms rectangular pulse
		4,000	4,000	4,000	4,000		50 Hz half cycle sine wave or 6 ms rectangular pulse Same conditions as above except with V_{RRM} applied following surge = 0.
		4,150	4,150	4,150	4,150		60 Hz half cycle sine wave or 5 ms rectangular pulse
I^2t	Max. I^2t capability for fusing	56,000	56,000	56,000	56,000	A^2s	$t = 10$ ms Rated V_{RRM} applied following surge, initial $T_J = \text{Max. rated}$
		51,000	51,000	51,000	51,000		$t = 8.3$ ms
	Max. I^2t capability for individual device fusing	79,000	79,000	79,000	79,000		$t = 10$ ms $V_{RRM} = 0$ following surge, initial $T_J = \text{Max. rated}$
		72,000	72,000	72,000	72,000	$t = 8.3$ ms	
I^2	Max. $I^2\sqrt{t}$ capability for individual device fusing ^③	790,000	790,000	790,000	790,000	$\text{A}^2\sqrt{\text{s}}$	V_{RRM} following surge = 0.
V_{FM}	Max. peak forward voltage	1.65	1.65	1.65	1.65	V	$I_{F(AV)} = 250\text{A}$ (785A peak), $T_C = \text{Max. rated}$
$I_R(AV)$	Max. average reverse current	20	20	20	20	mA	Max. rated $I_{F(AV)}$, V_{RRM} and T_C

① Max. T_J limited to 125°C on 251ULXXS10 and 251ULRXXS10.

② I^2t for time $t_x = I^2\sqrt{t} = \sqrt{t_x}$.

③ In any device, $t_{rr} = t_a + t_b$.

THERMAL-MECHANICAL SPECIFICATIONS

	251ULXXS10	251ULRXXS10	251ULXXS15 thru 251ULXXS25	251ULRXXS15 thru 251ULRXXS25	Units	Conditions
T_J Max. operating junction temperature range	-40 to 125	-40 to 125	-40 to 175	-40 to 175	$^{\circ}\text{C}$	
T_{stg} Max. storage temperature range	-40 to 200	-40 to 200	-40 to 200	-40 to 200	$^{\circ}\text{C}$	
R_{thJC} Max. internal thermal resistance, junction-to-case	0.15	0.12	0.15	0.12	deg. C/W	DC operation
R_{thCS} Thermal resistance, case-to-sink	0.08	0.08	0.08	0.08	deg. C/W	Mounting surface flat, smooth and greased.
T Mounting torque	Min.	31.5 (275)	31.5 (275)	31.5 (275)	N • m (lbf-in.)	
	Max.	37 (325)	37 (325)	37 (325)		
wt Approximate weight	215 (7.5)	215 (7.5)	215 (7.5)	215 (7.5)	g (oz.)	
Case style	DO-205AB (DO-9) (B-13)					JEDEC

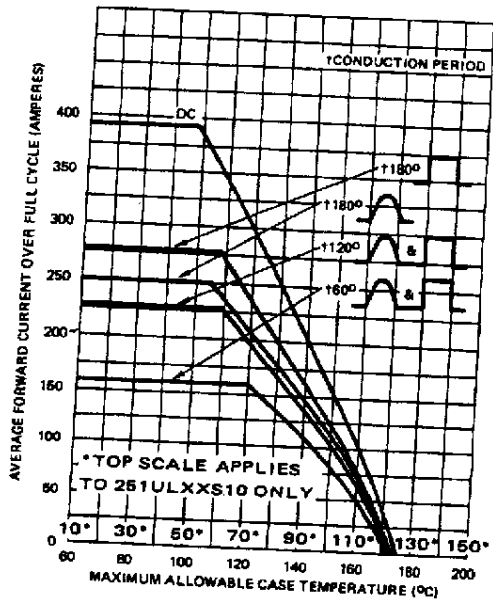


Fig. 1 – Average Forward Current Vs. Case Temperature, 251UL Series

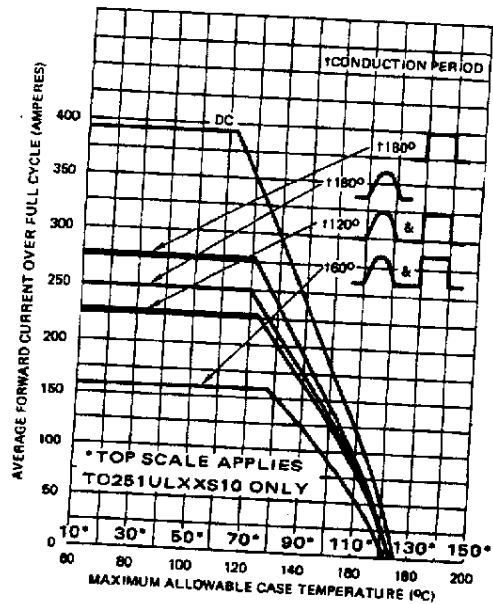


Fig. 2 – Average Forward Current Vs. Case Temperature, 251ULR Series

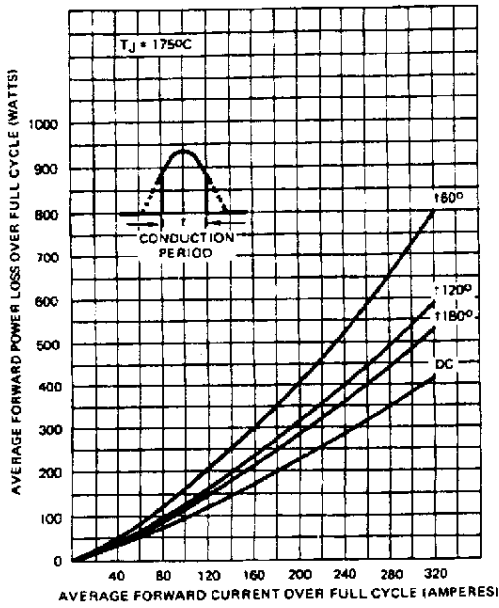


Fig. 3 – Maximum Low-Level Power Loss Vs. Forward Current (Sinusoidal Current Waveform)

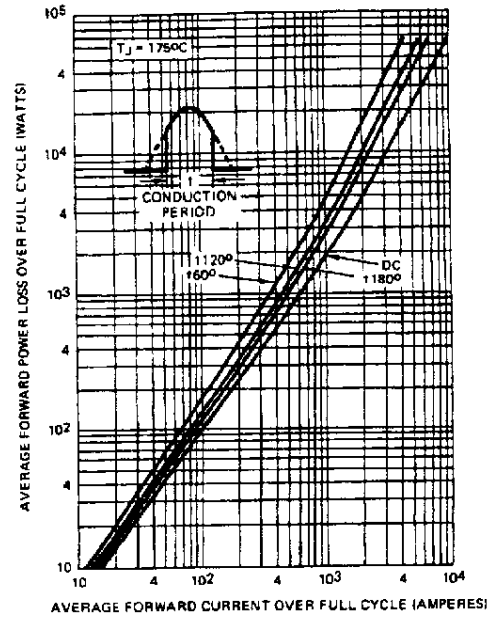


Fig. 4 – Maximum High-Level Power Loss Vs. Forward Current (Sinusoidal Current Waveform)

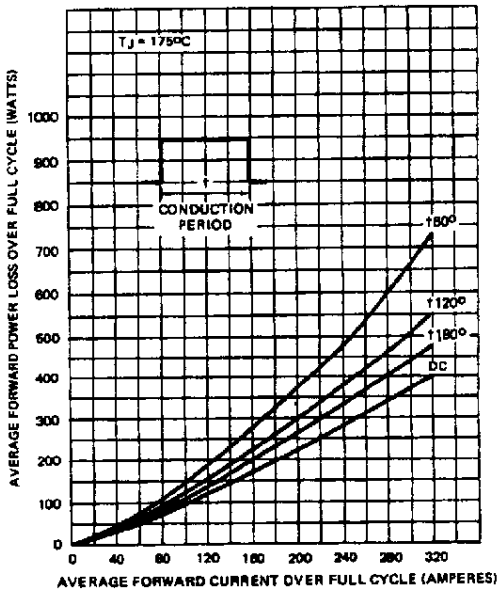


Fig. 5 – Maximum Low-Level Forward Power Loss Vs. Forward Current (Rectangular Current Waveform)

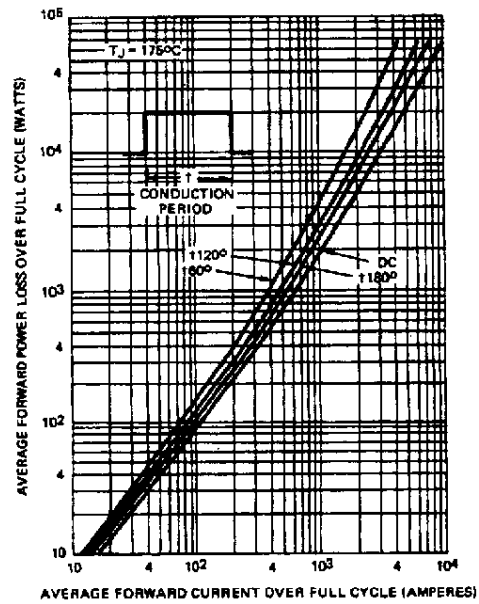


Fig. 6 – Maximum High-Level Forward Power Loss Vs. Forward Current (Rectangular Current Waveform)



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