

Data Sheet No. PD-2.058B

4855452 INTERNATIONAL RECTIFIER

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40CDQ & 60CDQ SERIES AND SD241

40 and 60 Amp Dual Schottky Center Tap Rectifiers

Major Ratings and Characteristics

Characteristics	40CDQ	SD241	60CDQ	Units
I _O Rectangular Waveform	40	60	60	A
	Sinusoidal Waveform	36	54	
I _{FSM}	@ 50 Hz	380	475	A
	@ 60 Hz	400	500	
I ² _t	@ 50 Hz	730	1140	A ² s
	@ 60 Hz	665	1040	
I ² √t	10,325		16,130	A ² √s
V _{RWM}	20 - 45	35	20 - 45	V
C _t @ -5V	1400			pF
T _J	-55 to 175			°C

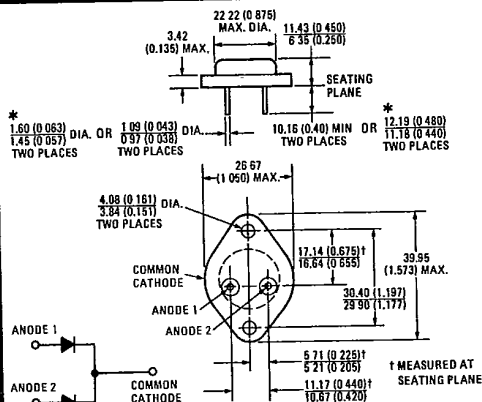
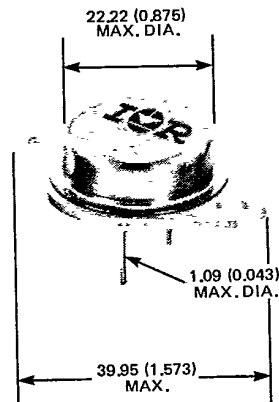
Description/Features

The 40CDQ and 60CDQ Dual Schottky Rectifier Series and SD241 employ the "830" process which results in a very low ratio of reverse leakage current to junction temperature. In addition to offering improvements in reliability and performance, they are rugged devices with a guaranteed repetitive peak reverse voltage capability, and excellent ability to withstand reverse energy transients. They can be used in both existing and new designs.

- 175°C T_J operation
- 100% reverse energy tested (each junction)
- 400A and 500A surge, 60 Hz, one cycle (per junction)
- Extremely low reverse leakage: 10 mA @ 25°C
- No voltage derating of V_{RWM} over temperature range
- A guaranteed repetitive peak reverse voltage capability for short pulses which is 20% above V_{RWM}
- High power supply reliability
- Minimizes problem of thermal runaway
- TO-204AE (Modified TO-3) Case Style available (60CDQ series)
- Can be supplied to meet stringent military, aerospace and other high-reliability requirements.



CASE STYLE AND DIMENSIONS



Conforms to JEDEC Outline TO-204AA (TO-3)
 *Conforms to JEDEC Outline TO-204AE (Modified TO-3)
 All Dimensions in Millimeters and (Inches)

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VOLTAGE RATINGS PER JUNCTION



Part Numbers			V_{RWM} - Max. Working Peak Reverse Voltage (V) ①	V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) ② ($t_p = 200$ ns Max.)	V_R - Max. Direct Reverse Voltage (V) ③
40CDQ020	—	60CDQ020	20	24	20
40CDQ030	—	60CDQ030	30	36	30
40CDQ035	SD241	60CDQ035	35 ③	42 ③	35
40CDQ040	—	60CDQ040	40	48	40
40CDQ045	—	60CDQ045	45	54	45

ELECTRICAL SPECIFICATIONS

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		40CDQ	SD241	60CDQ	Units	Conditions
I_O	Max. average output current from center tap circuit	40	60	60	A	180° conduction, rectangular waveform, $T_C = -40$ to 143°C for 40CDQ, $T_C = -40$ to 120°C for 60CDQ.
		36	54	54		180° conduction, sinusoidal waveform, $T_C = -40$ to 141°C for 40CDQ, $T_C = -40$ to 116°C for 60CDQ.
I_{FSM}	Max. peak one cycle, non-repetitive surge current, per junction	.380		475	A	50 Hz half cycle sine wave or 6 ms rectangular pulse, Following any rated load condition and with rated V_{RWM} applied.
		400		500		
		455		570	A	50 Hz With $V_{RWM} = 0$ following surge, initial $T_J = 175^\circ\text{C}$.
		475		595		
I^2t	Max. I^2t for fusing, per junction	730		1140	A^2s	$t = 10$ ms. Rated V_{RWM} following surge, initial $T_J = 175^\circ\text{C}$.
		665		1040		
I^2t	Max. I^2t for individual junction fusing, per junction	1030		1610	A^2s	V_{RWM} following surge = 0, initial $T_J = 175^\circ\text{C}$.
		940		1470		
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ for individual ① junction fusing, per junction	10,325		16,130	$A^2\sqrt{s}$	$t = 0.1$ to 10 ms, $T_J = 175^\circ\text{C}$, $V_{RWM} = 0$ following surge.
V_{FM}	Max. peak forward voltage per junction	0.70	0.82		V	$T_J = 25^\circ\text{C}$ $I_{FM} = 20\text{A}$ peak for 40CDQ, $I_{FM} = 30\text{A}$ peak for 60CDQ and SD241 180° rectangular wave. Rated $I_F(AV)$ (40A peak for 40CDQ, 60A peak for 60CDQ and SD241) 180° rectangular wave.
		0.91	1.09			
		0.74	0.92			
I_{RM}	Max. peak reverse current, per junction	10			mA	$T_J = 25^\circ\text{C}$ $V_{RM} = \text{rated } V_{RWM}$
		20				
I_{RRM}	Max. repetitive peak reverse current	2.0			A	$T_C = 25^\circ\text{C}$, $t_p = 2$ μs rectangular pulse, $f = 1$ kHz. ① see fig. 11 for test circuit.
C_t	Max. capacitance, per junction	1400			pF	$T_C = 25^\circ\text{C}$, $V_R = 5$ Vdc (Test signal in the range of 100 kHz to 1 MHz)
dv/dt	Max. rate of application of reverse voltage, per junction	1000			V/ μs	$T_C = 25^\circ\text{C}$, $V_{RM} = \text{rated } V_{RWM}$

THERMAL-MECHANICAL SPECIFICATIONS

T_J	Max. operating junction temperature range	-55 to 175		°C	
T_{stg}	Max. storage temperature range	-55 to 175		°C	
R_{thJC}	Max. thermal resistance, junction-to-case, DC operation	1.4		deg. C/W	Based on power dissipated in one junction, both junctions operating.
	Max. composite thermal resistance, junction-to-case, DC operation	0.7			Based on power dissipated in both junctions.
R_{thCS}	Thermal resistance, case-to-sink	0.2		deg. C/W	Mounting surface flat, smooth and greased.
wt	Approximate weight	12.8 (0.45)		g (oz.)	
Case Style		TO-204AA (TO-3)	TO-204AE (Modified TO-3)		Terminals 1 and 2: Anodes 1 and 2 Case: Common Cathodes

① $T_C = -55$ to 172°C , 180° conduction

② $T_C = 0$ to 172°C , 180° conduction

③ $T_C = -55$ to 162°C .

④ For SD241 rated V_{RWM} and $V_{RRM} = 45\text{V}$ @ $T_J = 25^\circ\text{C}$; $= 35\text{V}$ @ $T_J = 150^\circ\text{C}$

⑤ I^2t for time $t_x = I^2\sqrt{t} \cdot \sqrt{t_x}$.

⑥ For test circuit refer to Fig. 11.

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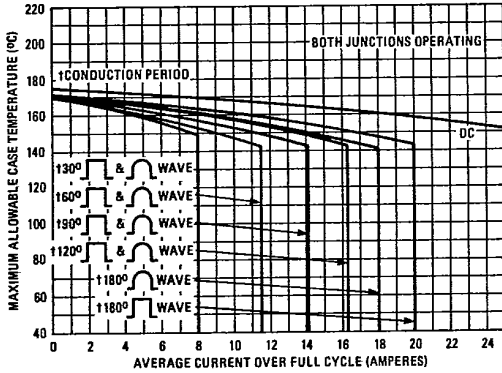


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction (40CDQ Series)

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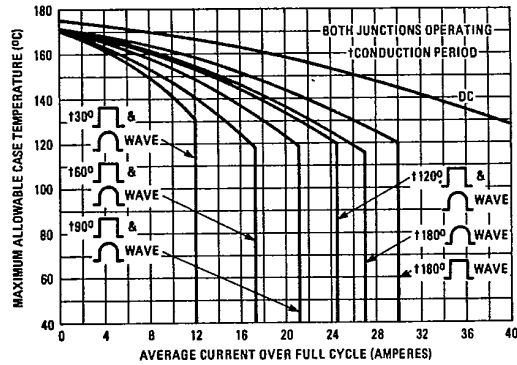


Fig. 2 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction (60CDQ Series and SD241)

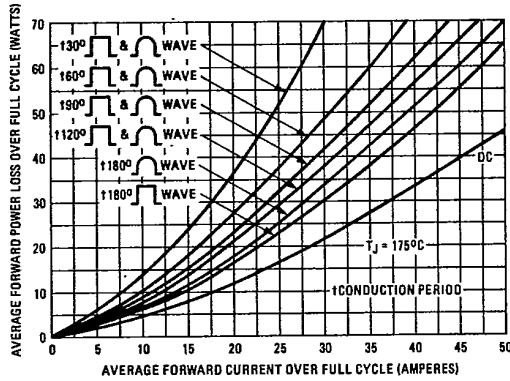


Fig. 3 - Maximum Forward Power Loss Vs. Average Forward Current, Per Junction (Both Series and SD241)

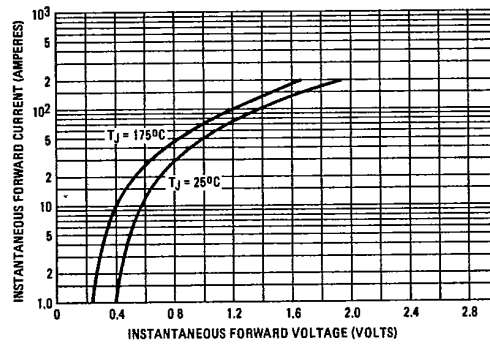


Fig. 4 - Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction (Both Series and SD241)

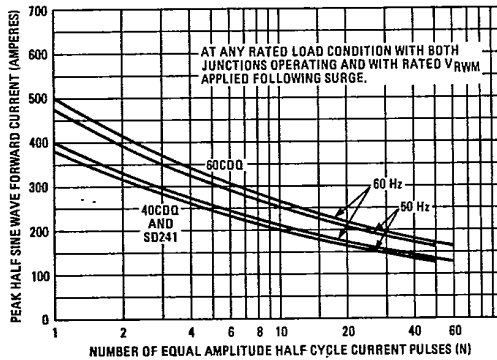


Fig. 5 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction (Both Series and SD241)

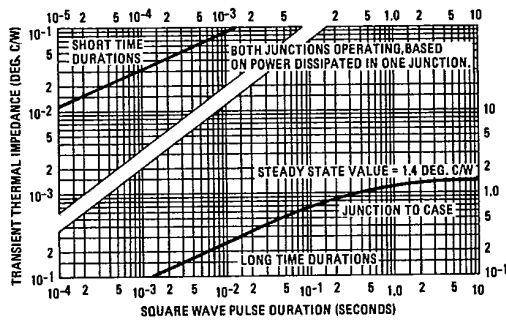


Fig. 6 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction (Both Series and SD241)



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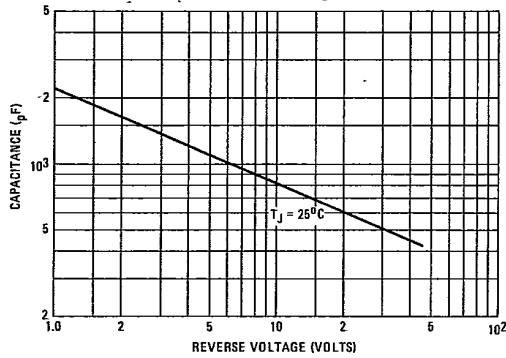


Fig. 7 - Typical Capacitance Vs. Reverse Voltage, Per Junction (Both Series and SD241)

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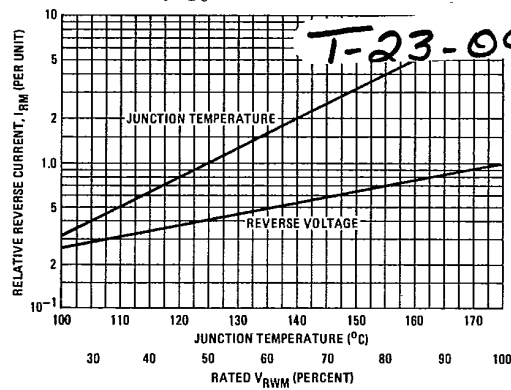


Fig. 8 - Typical Variation of Reverse Current Vs. Junction Temperature and Reverse Voltage, Per Junction (Both Series and SD241)

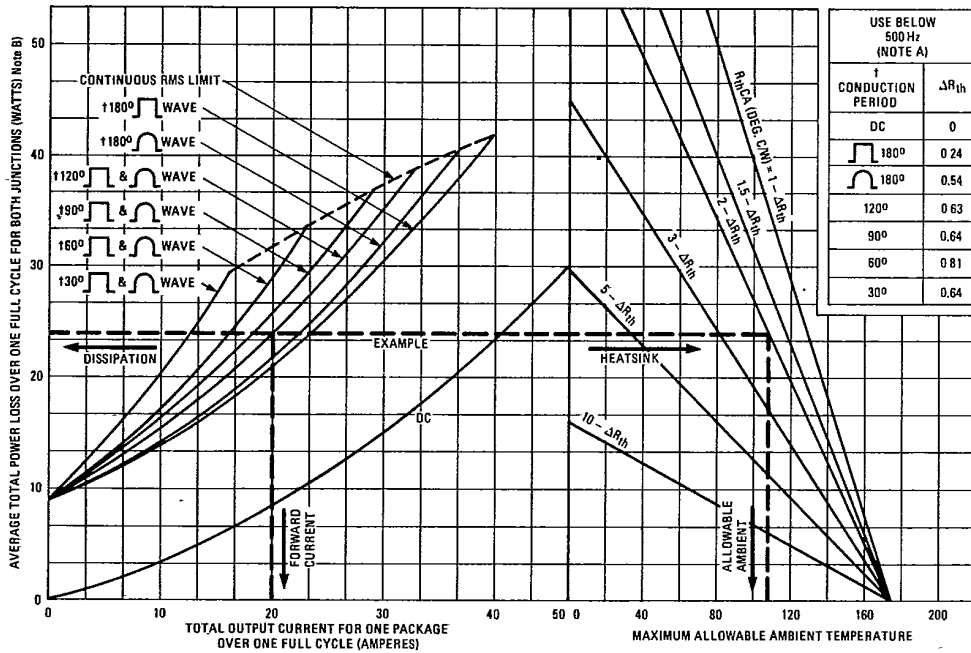


Fig. 9 - Thermal Nomogram (40CDQ Series)

Note A: Maximum allowable heatsink thermal resistance, R_{thSA} , equals the graph value minus ΔR_{th} minus R_{thCS} . At frequencies above 5000 Hz, ΔR_{th} becomes essentially zero and can be ignored.

Note B: The total power dissipation curves assume the worst case reverse conditions of half wave rectangular reverse voltage, full rated V_{RWM} and $T_j = 175^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

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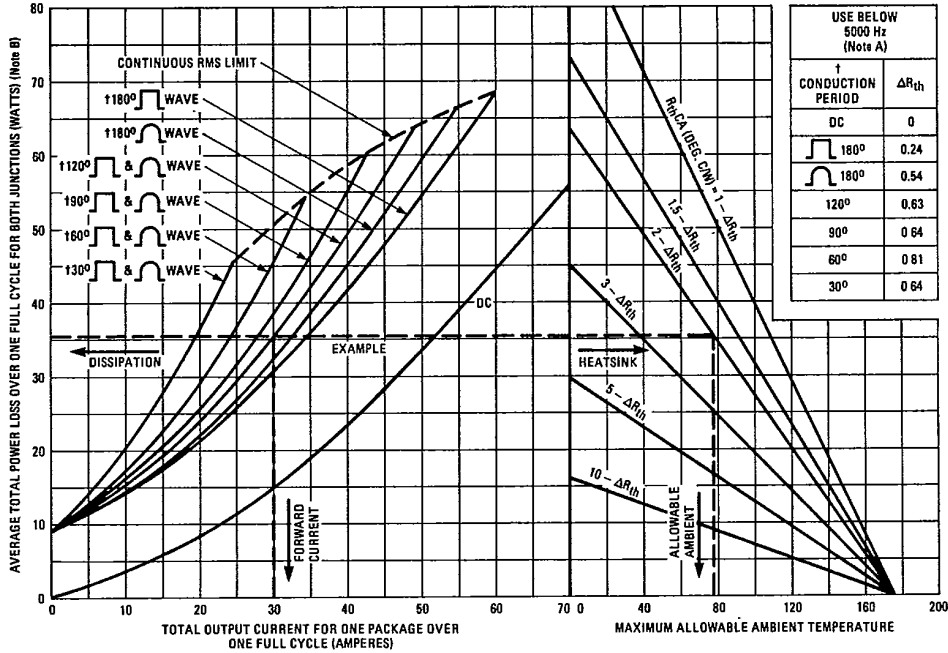


Fig. 10 – Thermal Nomogram (60CDQ Series and SD241)

- Note-A: Maximum allowable heatsink thermal resistance, R_{thSA} , equals the graph value minus ΔR_{th} minus R_{thCS} . At frequencies above 5000 Hz, ΔR_{th} becomes essentially zero and can be ignored.
- Note B: The total power dissipation curves assume the worst case reverse conditions of half wave rectangular reverse voltage, full rated V_{RWM} and $T_J = 175^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

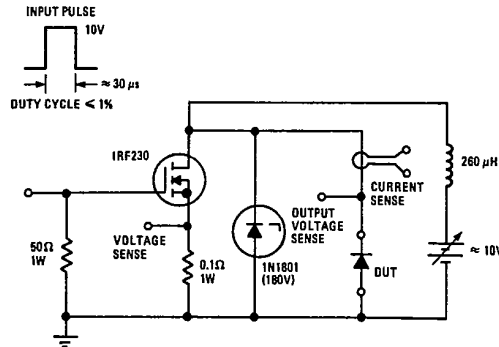


Fig. 11 – I_{RRM} Test Circuit