

Data Sheet No. PD-2.058B

4855452 INTERNATIONAL RECTIFIER

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INTERNATIONAL RECTIFIER **IR**

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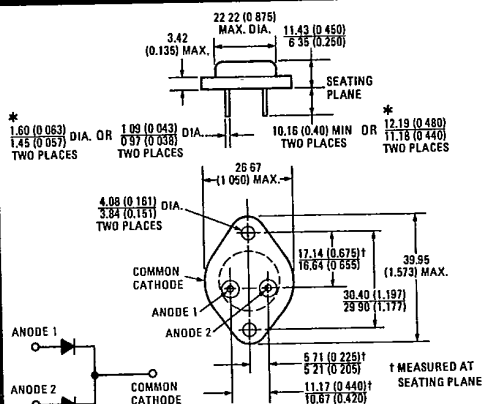
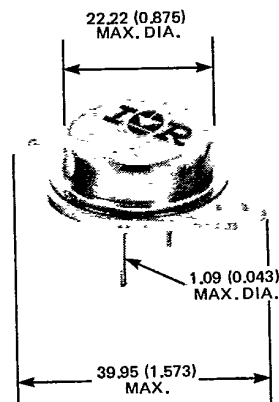
40CDQ & 60CDQ SERIES AND SD241**40 and 60 Amp Dual Schottky
Center Tap Rectifiers****Major Ratings and Characteristics**

Characteristics	40CDQ	SD241	60CDQ	Units
I_O Rectangular Waveform	40	60	60	A
Sinusoidal Waveform	36	54	54	
I_{FSM} @ 50 Hz	380	475		A
@ 60 Hz	400	500		
I_{2t} @ 50 Hz	730	1140		A^2s
@ 60 Hz	665	1040		
$I_2\sqrt{t}$	10,325	16,130		$A^2\sqrt{s}$
V_{RWM}	20 - 45	35	20 - 45	V
C_t @ -5V	1400			pF
T_J	-55 to 175			$^{\circ}C$

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 $^{\circ}C$ 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 $^{\circ}C$
- 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)

40CDQ & 60CDQ Series and SD241
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VOLTAGE RATINGS PER JUNCTION

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Part Numbers			V_{RWM} - Max. Working Peak Reverse Voltage (V) ①	V_{RRM} - Max. Repetitive Peak Reverse Voltage (V) ① ($t_p = 200$ ns Max.)	V_R - Max. Direct Reverse Voltage (V) ①
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	A	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	A	60 Hz half cycle sine wave or 5 ms rectangular pulse,
	455		570	A	50 Hz With $V_{RWM} = 0$ following surge, initial $T_J = 175^\circ\text{C}$.
	475		595	A	60 Hz
I^2t Max. I^2t for fusing, per junction	730		1140	A ² s	$t = 10$ ms. Rated V_{RWM} following surge, initial $T_J = 175^\circ\text{C}$.
	665		1040	A ² s	$t = 8.3$ ms.
I^2t Max. I^2t for individual junction fusing, per junction	1030		1610	A ² s	$t = 10$ ms. V_{RWM} following surge = 0, initial $T_J = 175^\circ\text{C}$.
	940		1470	A ² s	$t = 8.3$ ms.
$I^2\sqrt{t}$ Max. $I^2\sqrt{t}$ for individual junction fusing, per junction ①	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
	0.91	1.09		V	180° rectangular wave.
	0.74	0.92		V	Rated $I_F(AV)$ (40A peak for 40CDQ, 60A peak for 60CDQ and SD241)
				V	180° rectangular wave.
I_{RM} Max. peak reverse current, per junction	10			mA	$T_J = 25^\circ\text{C}$
	20			mA	$T_J = 125^\circ\text{C}$ $V_{RM} = \text{rated } V_{RWM}$
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	deg. C/W	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° conduction② $T_C = 0$ to 172°C , 180° conduction③ $T_C = -55$ 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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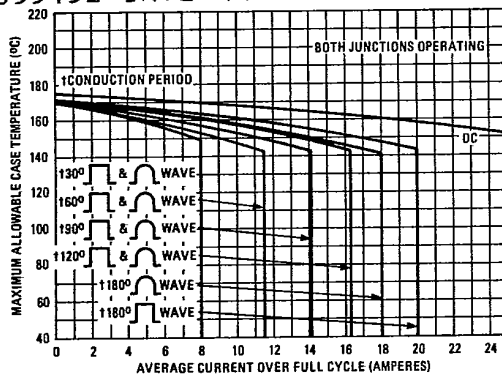


Fig. 1 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction (40CDQ Series)

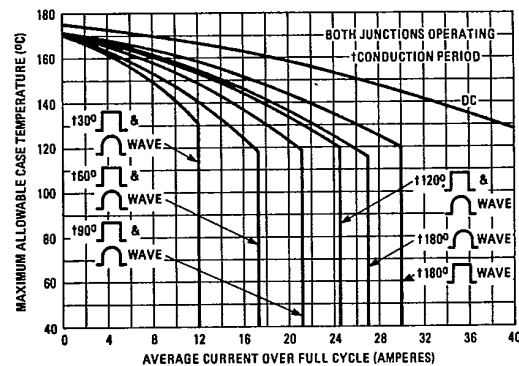


Fig. 2 - Maximum Allowable Case Temperature Vs. Average Forward Current, Per Junction (60CDQ Series and SD241)

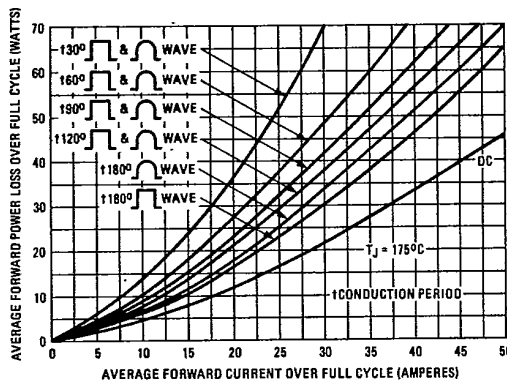


Fig. 3 - Maximum Forward Power Loss Vs. Average Forward Current, Per Junction (Both Series and SD241)

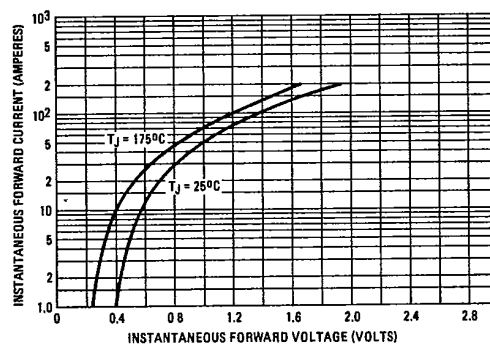


Fig. 4 - Maximum Instantaneous Forward Voltage Vs. Instantaneous Forward Current, Per Junction (Both Series and SD241)

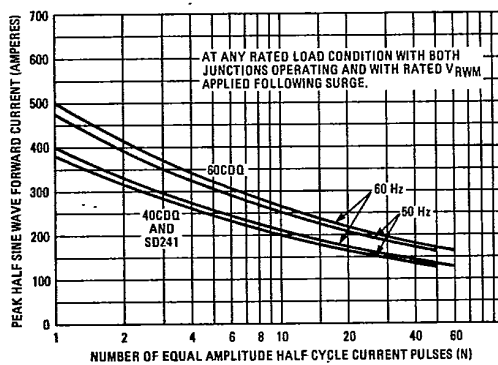


Fig. 5 - Maximum Non-Repetitive Surge Current Vs. Number of Cycles, Per Junction (Both Series and SD241)

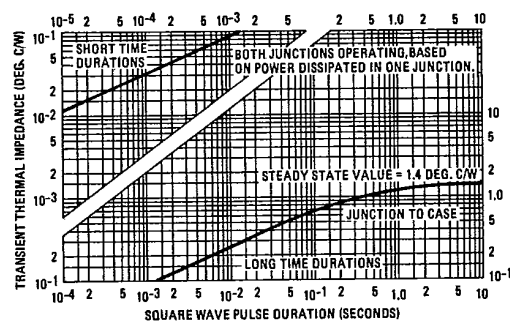


Fig. 6 - Maximum Transient Thermal Impedance, Junction-to-Case, Vs. Square Wave Pulse Duration, Per Junction (Both Series and SD241)

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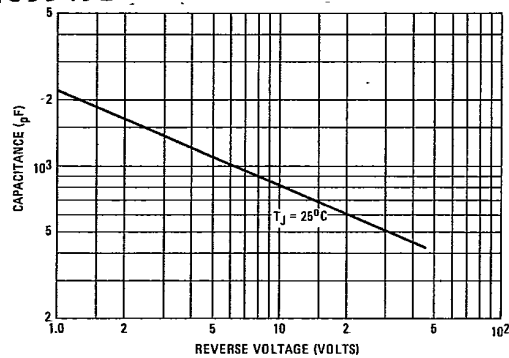


Fig. 7 - Typical Capacitance
Vs. Reverse Voltage, Per Junction
(Both Series and SD241)

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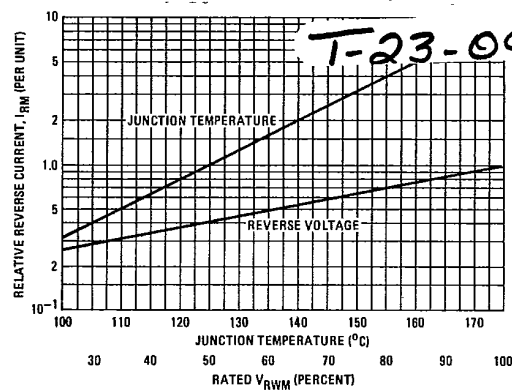


Fig. 8 - Typical Variation of Reverse Current Vs. Junction
Temperature and Reverse Voltage, Per Junction
(Both Series and SD241)

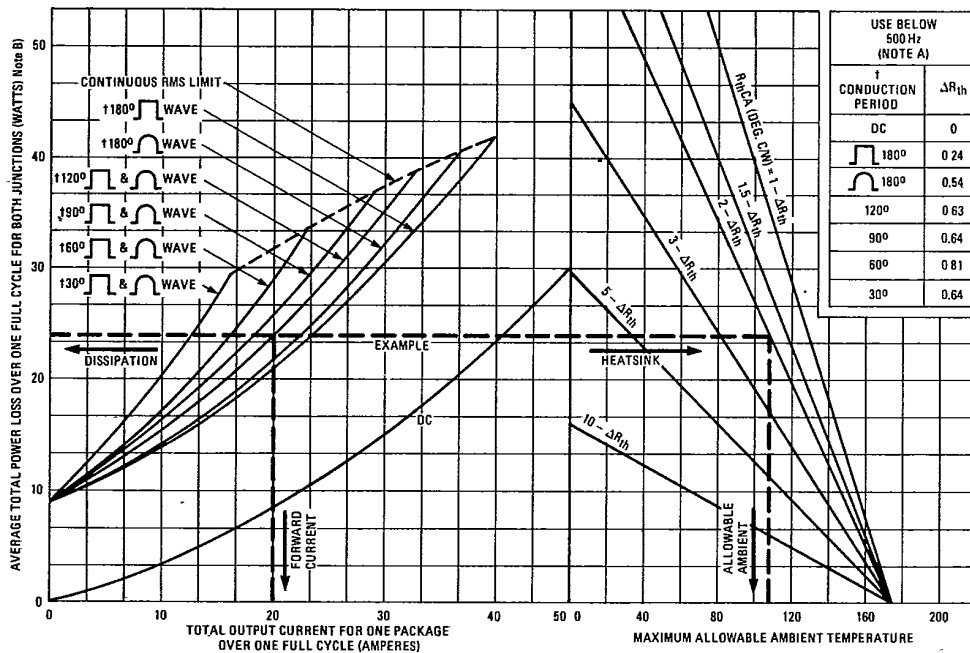


Fig. 9 - Thermal Nomogram
(40CDQ Series)

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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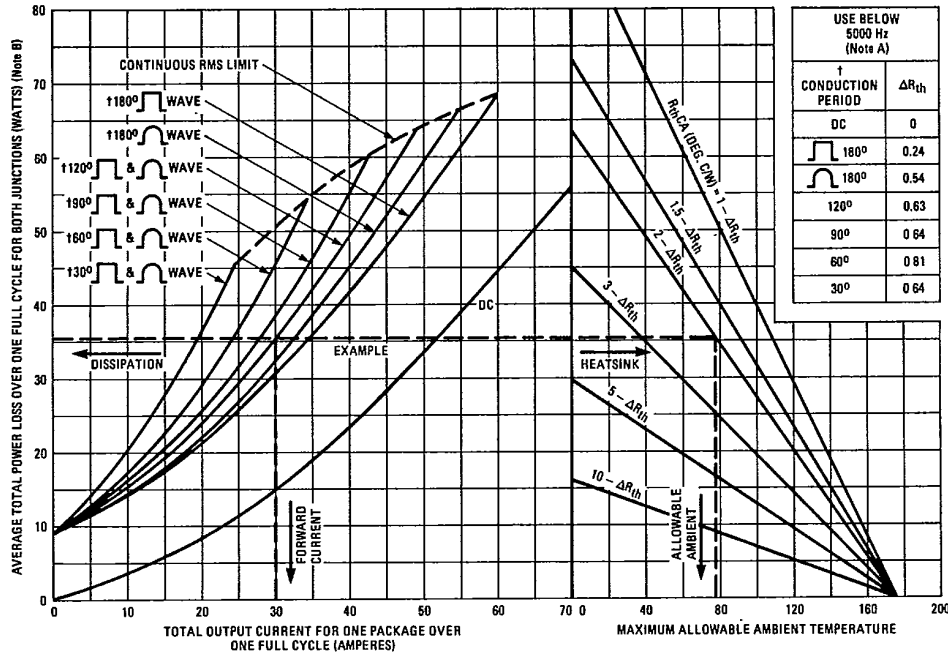


Fig. 10 - Thermal Nomogram
 (60CDQ Series and SD241)

- 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_{RRM} and $T_J = 175^\circ\text{C}$. Lower reverse losses allow higher operating ambient, smaller heatsinks or larger operating safety margin.

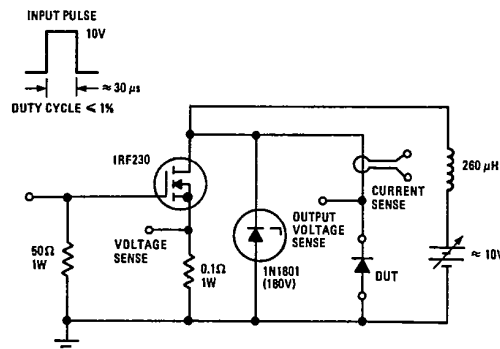


Fig. 11 - I_{RRM} Test Circuit