

# International IOR Rectifier

## 30CTQ060 30CTQ060S 30CTQ060 -1

SCHOTTKY RECTIFIER

30 Amp

$$I_{F(AV)} = 30\text{Amp}$$

$$V_R = 50 - 60\text{V}$$


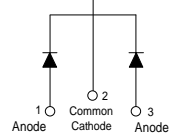

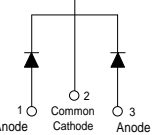

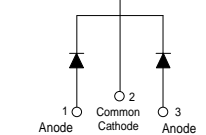
### Major Ratings and Characteristics

Characteristics	30CTQ	Units
$I_{F(AV)}$ Rectangular waveform	30	A
$V_{RRM}$	50 - 60	V
$I_{FSM}$ @ tp = 5 $\mu$ s sine	1000	A
$V_F$ @ 15 Apk, $T_J = 125^\circ\text{C}$ (per leg)	0.56	V
$T_J$ range	-55 to 150	$^\circ\text{C}$

### Description/ Features

This center tap Schottky rectifier has been optimized for very low forward voltage drop, with moderate leakage. The proprietary barrier technology allows for reliable operation up to 150° C junction temperature. Typical applications are in switching power supplies, converters, free-wheeling diodes, and reverse battery protection.

- 150° C  $T_J$  operation
- Center tap configuration
- Very low forward voltage drop
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability

Case Styles		
<p>30CTQ...</p>  <p>Base Common Cathode</p> <p>2</p>  <p>1 Anode 2 Common Cathode 3 Anode</p> <p>TO-220</p>	<p>30CTQ... S</p>  <p>Base Common Cathode</p> <p>2</p>  <p>1 Anode 2 Common Cathode 3 Anode</p> <p>D<sup>2</sup>PAK</p>	<p>30CTQ... -1</p>  <p>Base Common Cathode</p> <p>2</p>  <p>1 Anode 2 Common Cathode 3 Anode</p> <p>TO-262</p>

## Voltage Ratings

Part number	30CTQ050	30CTQ060
$V_R$ Max. DC Reverse Voltage (V)	50	60
$V_{RWM}$ Max. Working Peak Reverse Voltage (V)		

## Absolute Maximum Ratings

Parameters	Values	Units	Conditions
$I_{F(AV)}$ Max. Average Forward Current (Per Leg) * See Fig. 5 (Per Device)	15	A	50% duty cycle @ $T_C = 105^\circ\text{C}$ , rectangular wave form
	30		
$I_{FSM}$ Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg) * See Fig. 7	1000	A	5 $\mu\text{s}$ Sine or 3 $\mu\text{s}$ Rect. pulse
	260		10ms Sine or 6ms Rect. pulse
$E_{AS}$ Non-Repetitive Avalanche Energy (Per Leg)	13	mJ	$T_J = 25^\circ\text{C}$ , $I_{AS} = 1.50$ Amps, $L = 11.5$ mH
$I_{AR}$ Repetitive Avalanche Current (Per Leg)	1.50	A	Current decaying linearly to zero in 1 $\mu\text{sec}$ Frequency limited by $T_J$ max. $V_A = 1.5 \times V_R$ typical

## Electrical Specifications

Parameters	Values	Units	Conditions
$V_{FM}$ Max. Forward Voltage Drop (Per Leg) * See Fig. 1 (1)	0.62	V	@ 15A
	0.82	V	@ 30A
	0.56	V	@ 15A
	0.71	V	@ 30A
$I_{RM}$ Max. Reverse Leakage Current (Per Leg) * See Fig. 2 (1)	0.80	mA	$T_J = 25^\circ\text{C}$
	45	mA	$T_J = 125^\circ\text{C}$
$V_{F(TO)}$ Threshold Voltage	0.39	V	$T_J = T_J$ max.
$r_t$ Forward Slope Resistance	8.47	m $\Omega$	
$C_T$ Max. Junction Capacitance (Per Leg)	720	pF	$V_R = 5V_{DC}$ (test signal range 100Khz to 1Mhz) $25^\circ\text{C}$
$L_S$ Typical Series Inductance (Per Leg)	8.0	nH	Measured lead to lead 5mm from package body
dv/dt Max. Voltage Rate of Change (Rated $V_R$ )	10000	V/ $\mu\text{s}$	

(1) Pulse Width < 300 $\mu\text{s}$ , Duty Cycle <2%

## Thermal-Mechanical Specifications

Parameters	Values	Units	Conditions
$T_J$ Max. Junction Temperature Range	-55 to 150	$^\circ\text{C}$	
$T_{stg}$ Max. Storage Temperature Range	-55 to 150	$^\circ\text{C}$	
$R_{thJC}$ Max. Thermal Resistance Junction to Case (Per Leg)	3.25	$^\circ\text{C}/\text{W}$	DC operation
$R_{thJC}$ Max. Thermal Resistance Junction to Case (Per Package)	1.63	$^\circ\text{C}/\text{W}$	DC operation
$R_{thCS}$ Typical Thermal Resistance, Case to Heatsink	0.50	$^\circ\text{C}/\text{W}$	Mounting surface, smooth and greased (only for TO-220)
wt Approximate Weight	2 (0.07)	g (oz.)	
T Mounting Torque	Min.	6 (5)	Kg-cm (lbf-in)
	Max.	12 (10)	

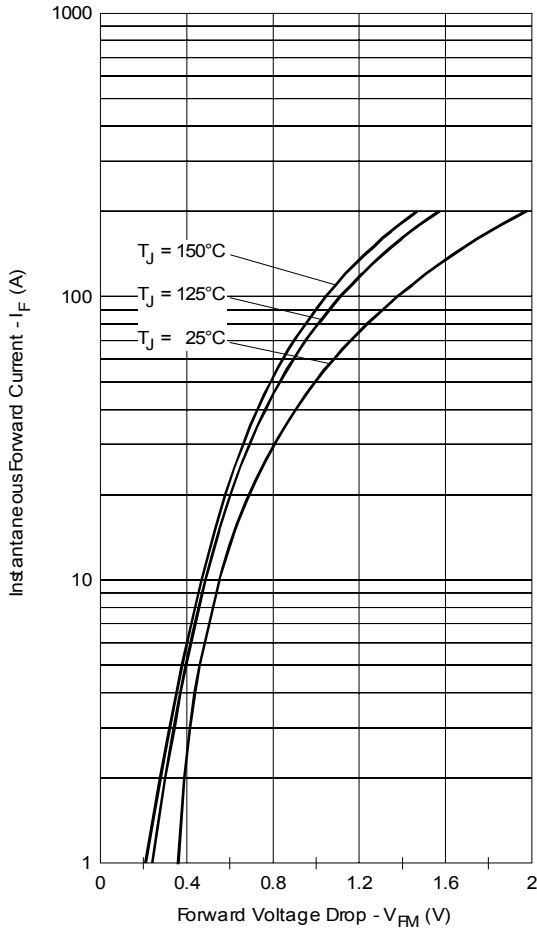


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

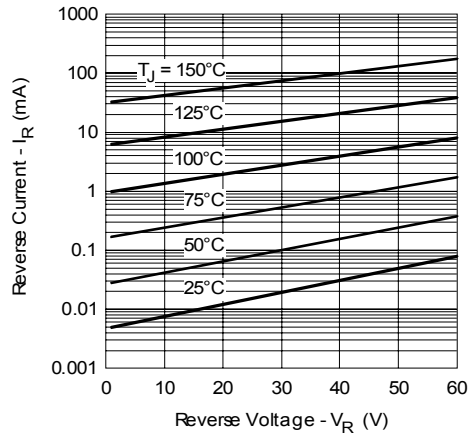


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

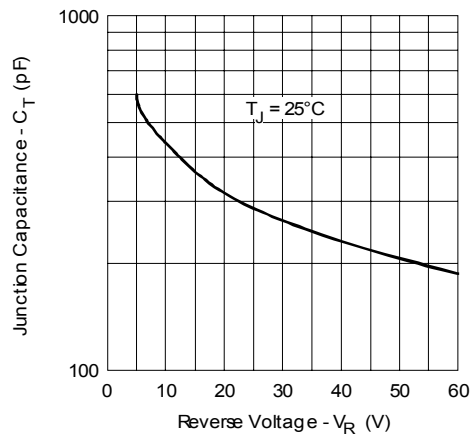


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

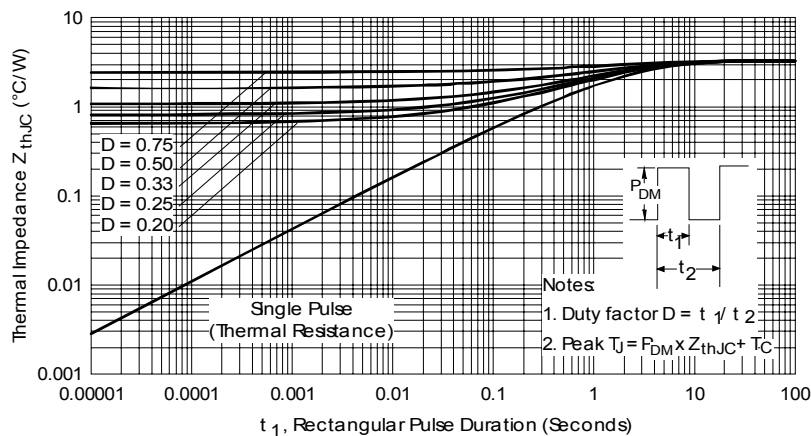


Fig. 4 - Max. Thermal Impedance  $Z_{thJC}$  Characteristics (Per Leg)

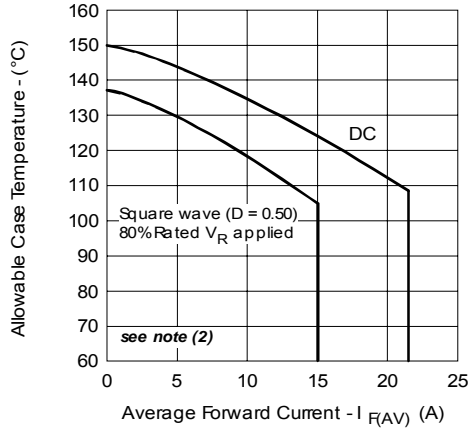


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

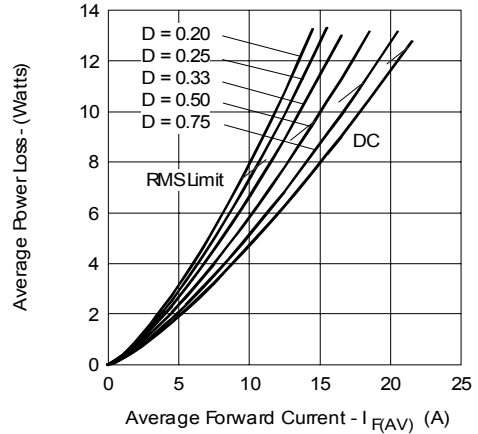


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

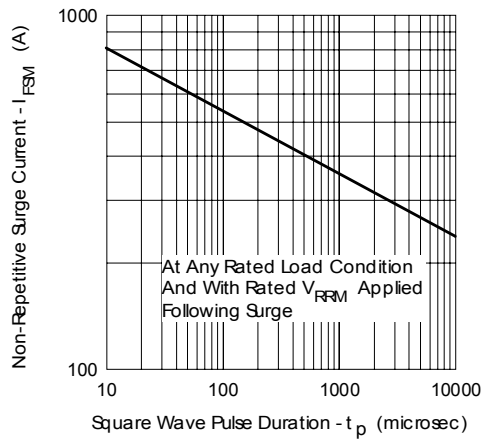


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

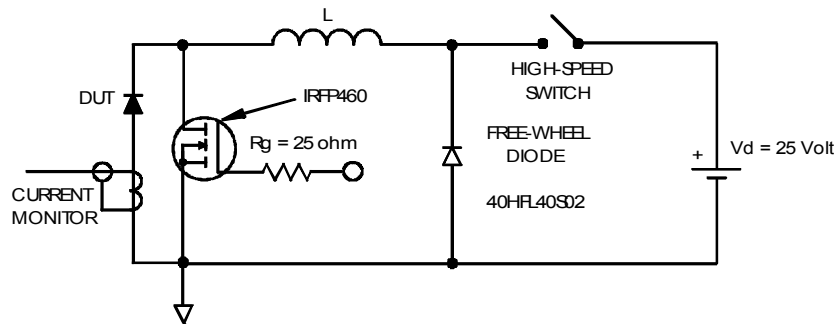


Fig. 8 - Unclamped Inductive Test Circuit

- (2) Formula used:  $T_c = T_j - (P_d + P_{d_{REV}}) \times R_{thJC}$ ;  
 $P_d = \text{Forward Power Loss} = I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$  (see Fig. 6);  
 $P_{d_{REV}} = \text{Inverse Power Loss} = V_{R1} \times I_{R1} (1 - D); I_{R1} @ V_{R1} = 10 \text{ V}$

Outline Table

**NOTES:**

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
- LEAD DIMENSION AND FROM UNCONTROLLED FLAT
- DIMENSION D, E & F DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- DIMENSION b1 & c1 APPLY TO BASE METAL ONLY.
- CONTROLLING DIMENSION: INCH.
- THERMAL PAD CONTROL OPTIONAL. WITHIN DIMENSIONS L4/L2 & E1
- DIMENSION L2 IS AT DESIGN & USE WHERE THERMAL AND SIMULATION IRREGULARITIES ARE ALLOWED.
- OUTLINE CONFORMS TO JEDEC TO-220 (EXCEPT H [H1] AND D1 [H1]) WHERE DIMENSIONS ARE DERIVED FROM THE ACTUAL PACKAGE OUTLINE.

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	3.36	4.83	.140	.190	
A1	0.91	1.40	.020	.055	
A2	2.03	2.82	.080	.115	
b	0.36	1.01	.015	.040	
b1	0.38	0.97	.015	.038	5
b2	1.14	1.78	.045	.070	
c	1.14	1.73	.045	.068	5
c1	0.36	0.61	.014	.024	
c2	1.36	1.56	.054	.062	
D	14.22	16.51	.560	.650	4
D1	8.36	9.02	.330	.355	
D2	11.68	12.88	.460	.507	
E	8.65	10.67	.380	.420	4, 7
E1	6.06	6.89	.270	.300	7
E2	-	0.78	-	.030	4
e	2.54 BSC	-	.100 BSC	-	
H	14.61	15.88	.575	.625	7, 8
H1	12.70	14.73	.500	.580	
L	1.78	2.79	.070	.110	
L1	1.27	1.78	.050	.070	
L2	1.27	1.78	.050	.070	
L3	0.25 BSC	-	.010 BSC	-	
L4	4.78	5.28	.188	.208	
m	17.78	-	.700	-	
m1	8.89	-	.350	-	
n	11.43	-	.450	-	
o	2.08	-	.082	-	
p	3.81	-	.150	-	
R	0.51	0.71	.020	.028	
B	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**

**HEXFET**

- GATE
- 4 - DRAIN
- SOURCE

**IGBTs, CoPACK**

- GATE
- 4 - COLLECTOR
- EMITTER

**DIODES**

- ANODE \*
- 4 - CATHODE
- ANODE

\* PART DEPENDENT.

**Conform to JEDEC outline TO-220AB**

**NOTES:**

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994
- DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]
- DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY.
- DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
- CONTROLLING DIMENSION: INCH.

SYMBOL	MILLIMETERS		INCHES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	0.00	0.254	.000	.010	
b	0.51	0.99	.020	.039	
b1	0.51	0.89	.020	.035	4
b2	1.14	1.78	.045	.070	
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	4
c2	1.14	1.65	.045	.065	
D	8.51	9.65	.335	.380	3
D1	6.86	-	.270	-	
E	9.65	10.67	.380	.420	3
E1	6.22	-	.245	-	
e	2.54 BSC	-	.100 BSC	-	
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	1.27	1.65	.050	.065	
L2	1.27	1.78	.050	.070	
L3	0.25 BSC	-	.010 BSC	-	
L4	4.78	5.28	.188	.208	
m	17.78	-	.700	-	
m1	8.89	-	.350	-	
n	11.43	-	.450	-	
o	2.08	-	.082	-	
p	3.81	-	.150	-	
R	0.51	0.71	.020	.028	
B	90°	93°	90°	93°	

**LEAD ASSIGNMENTS**

**HEXFET**

- GATE
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**IGBTs, CoPACK**

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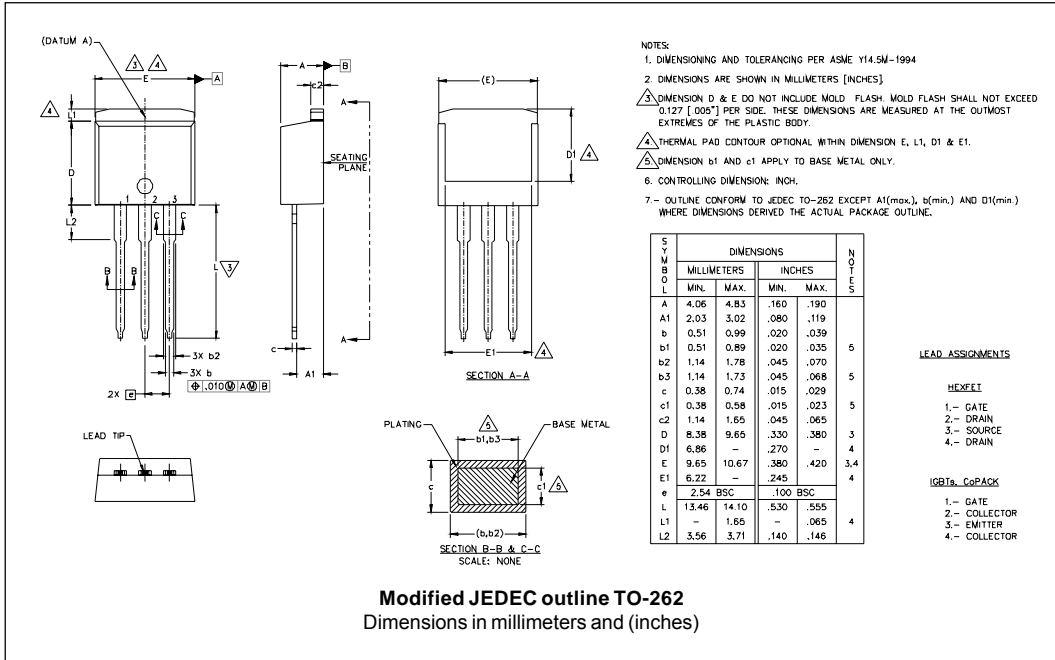
**DIODES**

- ANODE \*
- 4 - CATHODE
- ANODE

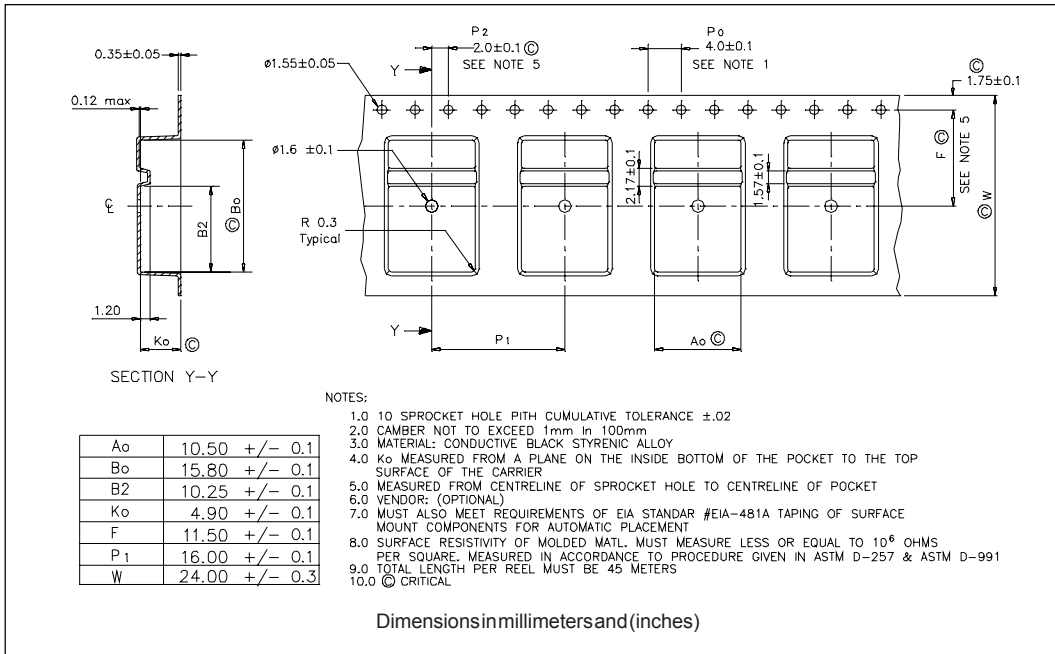
\* PART DEPENDENT.

**Conform to JEDEC outline D<sup>2</sup>Pak (SMD-220)**  
 Dimensions in millimeters and (inches)

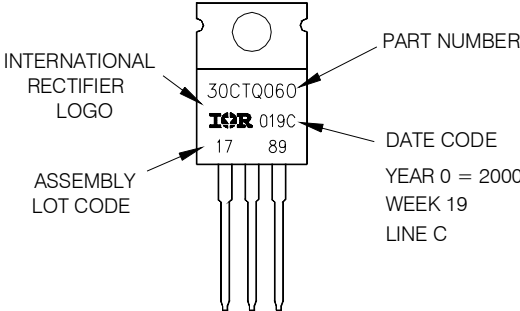
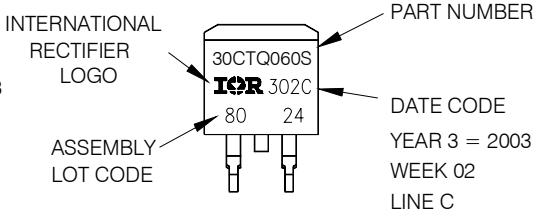
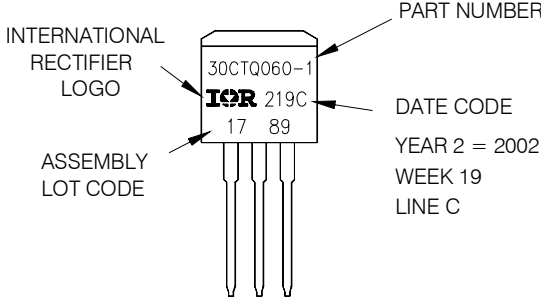
Outline Table



Tape & Reel Information



Part Marking Information

<p>TO-220</p>	<p>EXAMPLE: THIS IS A 30CTQ060                  LOT CODE 1789                  ASSEMBLED ON WW 19, 2000                  IN THE ASSEMBLY LINE "C"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                  YEAR 0 = 2000                  WEEK 19                  LINE C</p>
<p>D<sup>2</sup>PAK</p>	<p>EXAMPLE: THIS IS A 30CTQ060S                  LOT CODE 8024                  ASSEMBLED ON WW 02, 2003                  IN ASSEMBLY LINE "C"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                  YEAR 3 = 2003                  WEEK 02                  LINE C</p>
<p>TO-262</p>	<p>EXAMPLE: THIS IS A 30CTQ060-1                  LOT CODE 1789                  ASSEMBLED ON WW 19, 2002                  IN ASSEMBLY LINE "C"</p>	 <p>INTERNATIONAL RECTIFIER LOGO</p> <p>ASSEMBLY LOT CODE</p> <p>PART NUMBER</p> <p>DATE CODE                  YEAR 2 = 2002                  WEEK 19                  LINE C</p>

Ordering Information Table

Device Code		30	C	T	Q	060	S	TRL	-
		①	②	③	④	⑤	⑥	⑦	⑧
<b>1</b>	-	Current Rating (30A)							
<b>2</b>	-	Circuit Configuration C = Common Cathode							
<b>3</b>	-	T = TO-220							
<b>4</b>	-	Schottky "Q" Series							
<b>5</b>	-	Voltage Ratings							
<b>6</b>	-	<ul style="list-style-type: none"> <li>• S = D<sup>2</sup>Pak</li> <li>• -1= TO-262</li> </ul>							
<b>7</b>	-	<ul style="list-style-type: none"> <li>• none = Tube (50 pieces)</li> <li>• TRL = Tape &amp; Reel (Left Oriented - for D<sup>2</sup>Pak only)</li> <li>• TRR = Tape &amp; Reel (Right Oriented - for D<sup>2</sup>Pak only)</li> </ul>							
<b>8</b>	-	<ul style="list-style-type: none"> <li>• none = Standard Production</li> <li>• PbF = Lead-Free</li> </ul>							

050 = 50V
060 = 60V

Data and specifications subject to change without notice.  
This product has been designed and qualified for Industrial Level.  
Qualification Standards can be found on IR's Web site.