

International
IOR Rectifier

47CTQ020
47CTQ020S
47CTQ020-1

SCHOTTKY RECTIFIER

40 Amp

$$I_{F(AV)} = 40\text{Amp}$$

$$V_R = 20\text{V}$$

Major Ratings and Characteristics

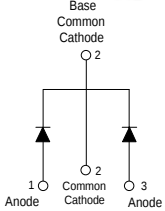
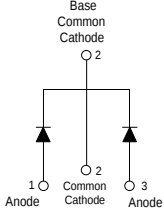
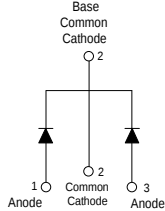
Characteristics	Values	Units
$I_{F(AV)}$ Rectangular waveform	40	A
V_{RRM}	20	V
I_{FSM} @ tp = 5 μ s sine	1000	A
V_F @ 20 Apk, $T_J = 125^\circ\text{C}$	0.34	V
T_J	-55 to 150	$^\circ\text{C}$

Description/ Features

This center tap Schottky rectifier has been optimized for ultra low forward voltage drop specifically for 3.3V output power supplies. The proprietary barrier technology allows for reliable operation up to 150 $^\circ\text{C}$ junction temperature. Typical applications are in parallel switching power supplies, converters, reverse battery protection, and redundant power subsystems.

- 150 $^\circ\text{C}$ T_J operation
- Center tap configuration
- Optimized for 3.3V application
- Ultra low forward voltage drop
- High frequency operation
- Guard ring for enhanced ruggedness and long term reliability
- High purity, high temperature epoxy encapsulation for enhanced mechanical strength and moisture resistance

Case Styles

47CTQ020	47CTQ020S	47CTQ020-1
  TO-220	  D²PAK	  TO-262

Voltage Ratings

Part number	47CTQ020, ..020S, ..020-1
V_R Max. DC Reverse Voltage (V) @ 125° C	20
V_R Max. DC Reverse Voltage (V) @ 150° C	10

Absolute Maximum Ratings

Parameters	47CTQ	Units	Conditions
$I_{F(AV)}$ Max. Average Forward (Per Device) Current (Per Leg)	40 20	A	50% duty cycle @ $T_C = 135^\circ\text{C}$, rectangular wave form
I_{FSM} Max. Peak One Cycle Non-Repetitive Surge Current (Per Leg)	1000 250	A	5 μs Sine or 3 μs Rect. pulse 10ms Sine or 6ms Rect. pulse Following any rated load condition and with rated V_{RRM} applied
E_{AS} Non-Repetitive Avalanche Energy (Per Leg)	18	mJ	$T_J = 25^\circ\text{C}$, $I_{AS} = 3\text{Amps}$, $L = 3\text{mH}$
I_{AR} Repetitive Avalanche Current (Per Leg)	3	A	Current decaying linearly to zero in 1 μsec Frequency limited by T_J max. $V_A = 1.5 \times V_R$ typical

Electrical Specifications

Parameters	47CTQ	Units	Conditions
V_{FM} Max. Forward Voltage Drop (Per Leg) (1)	0.45	V	@ 20A $T_J = 25^\circ\text{C}$
	0.51	V	@ 40A
	0.34	V	@ 20A $T_J = 125^\circ\text{C}$
	0.44	V	@ 40A
	0.31	V	@ 20A $T_J = 150^\circ\text{C}$
	0.42	V	@ 40A
I_{RM} Max. Reverse Leakage Current (Per Leg) (1)	3	mA	$T_J = 25^\circ\text{C}$ $V_R = \text{rated } V_R$
	310	mA	$T_J = 125^\circ\text{C}$
	60	mA	$T_J = 125^\circ\text{C}$ $V_R = 5\text{V}$
	45	mA	$T_J = 125^\circ\text{C}$ $V_R = 3.3\text{V}$
	306	mA	$T_J = 150^\circ\text{C}$ $V_R = 10\text{V}$
$V_{F(TO)}$ Threshold Voltage	0.188	V	$T_J = T_J \text{ max.}$
r_t Forward Slope Resistance	5.9	m Ω	
C_T Max. Junction Capacitance(Per Leg)	3000	pF	$V_R = 5V_{DC}$, (test signal range 100Khz to 1Mhz) 25°C
L_S Typical Series Inductance (Per Leg)	5.5	nH	Measured lead to lead 5mm from package body
dv/dt Max. Voltage Rate of Change (Rated V_R)	10000	V/ μs	

Thermal-Mechanical Specifications

(1) Pulse Width < 300 μs , Duty Cycle <2%

Parameters	47CTQ	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)	1.5	$^\circ\text{C/W}$	DC operation
R_{thJC} Max. Thermal Resistance Junction to Case (Per Package)	0.75	$^\circ\text{C/W}$	DC operation
R_{thCS} Typical Thermal Resistance, Case to Heatsink	0.50	$^\circ\text{C/W}$	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)	

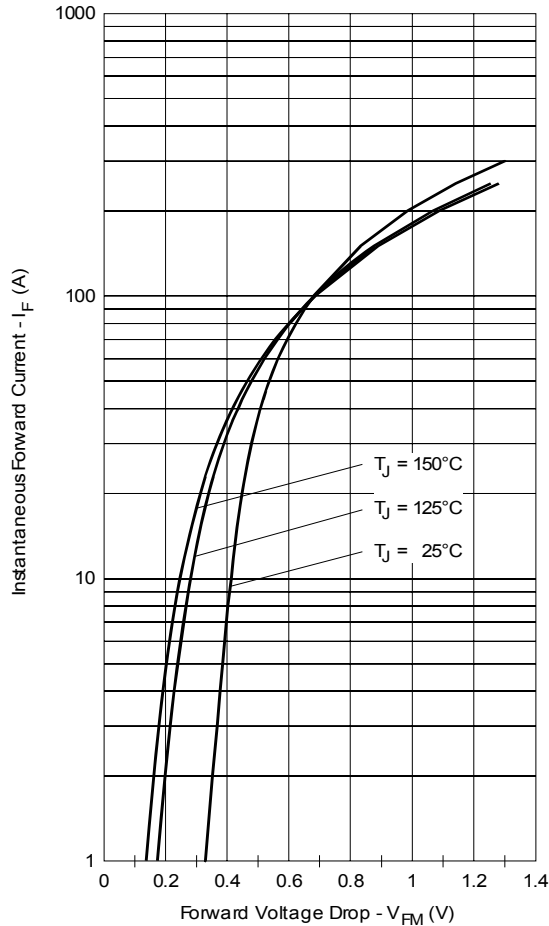


Fig. 1 - Max. Forward Voltage Drop Characteristics (Per Leg)

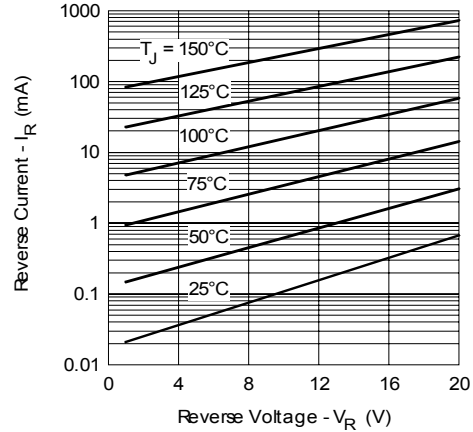


Fig. 2 - Typical Values Of Reverse Current Vs. Reverse Voltage (Per Leg)

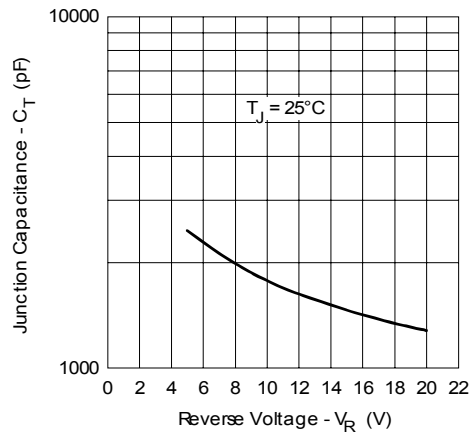


Fig. 3 - Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

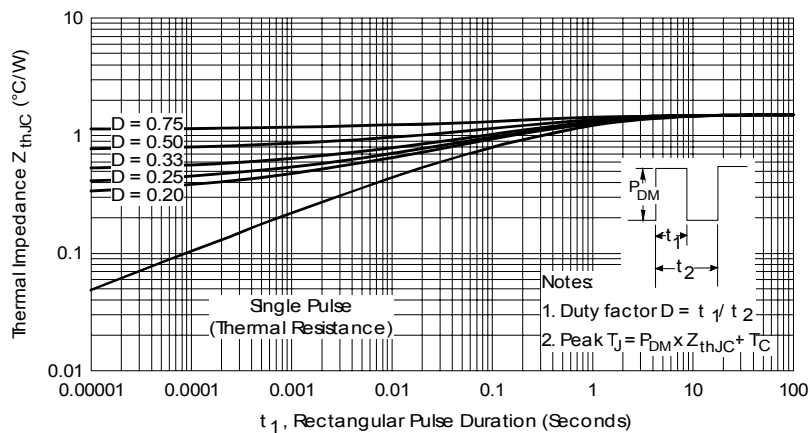


Fig. 4 - Max. Thermal Impedance Z_{thJC} Characteristics (Per Leg)

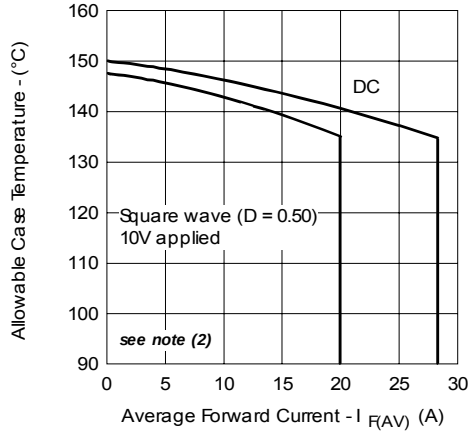


Fig. 5 - Max. Allowable Case Temperature Vs. Average Forward Current (Per Leg)

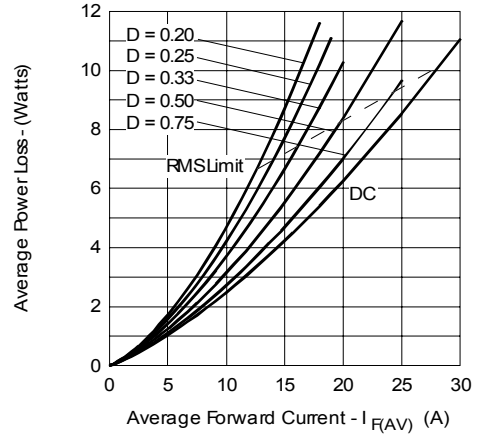


Fig. 6 - Forward Power Loss Characteristics (Per Leg)

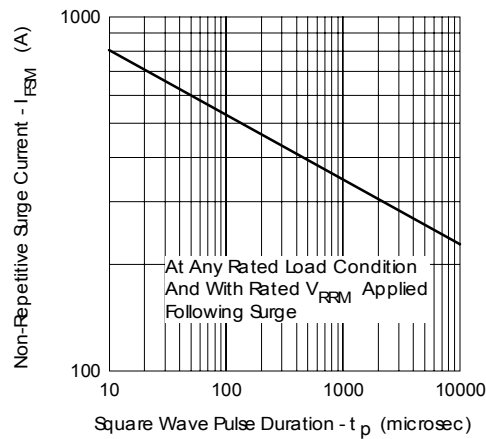


Fig. 7 - Max. Non-Repetitive Surge Current (Per Leg)

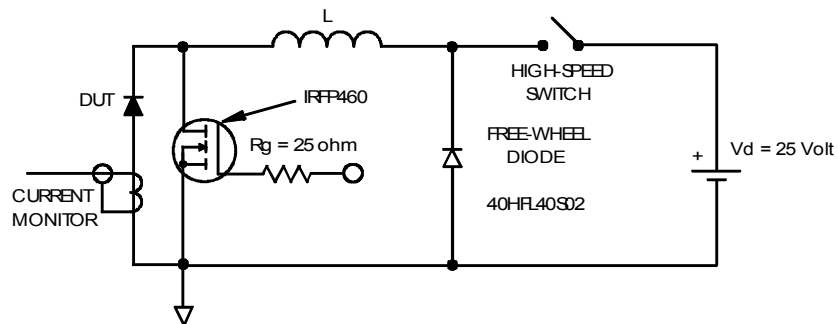


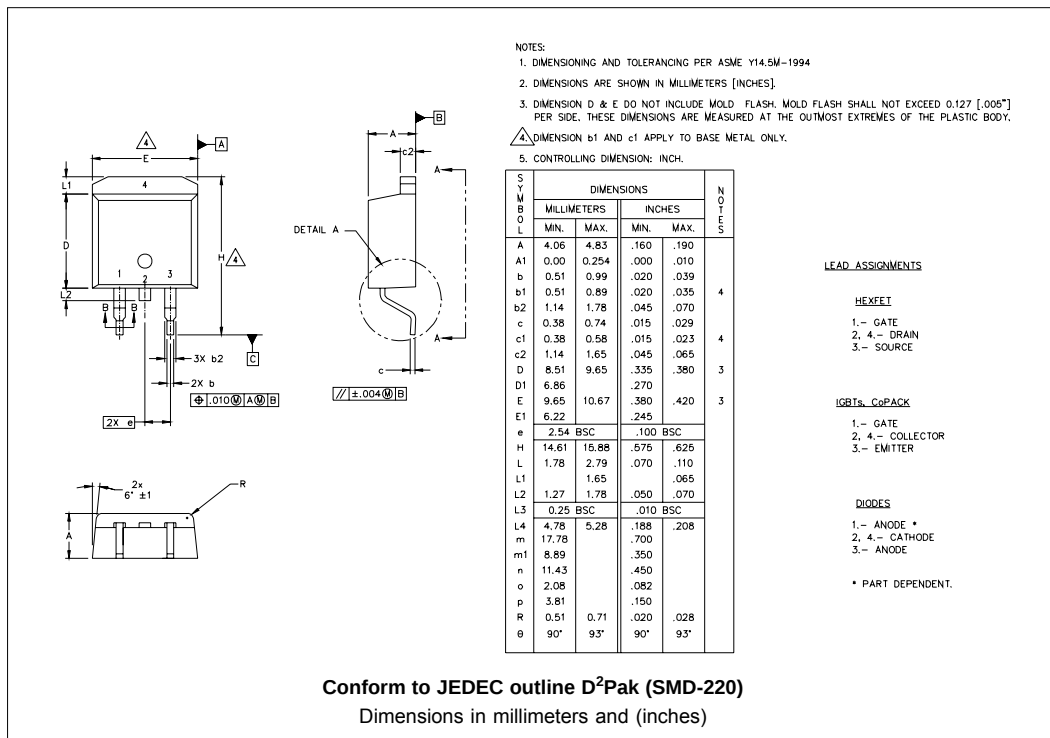
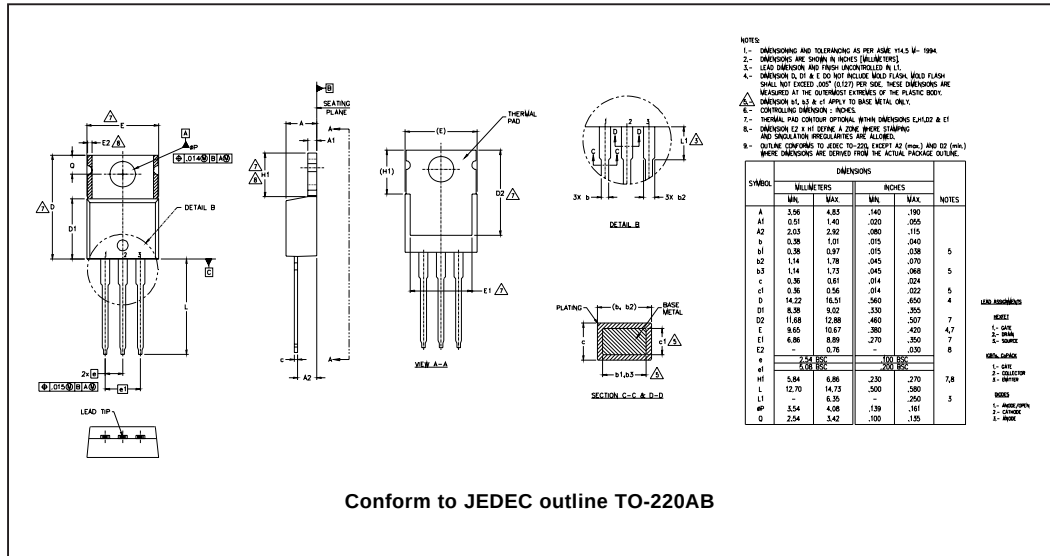
Fig. 8 - Unclamped Inductive Test Circuit

(2) Formula used: $T_C = T_J - (P_d + P_{d_{REV}}) \times R_{thJC}$;

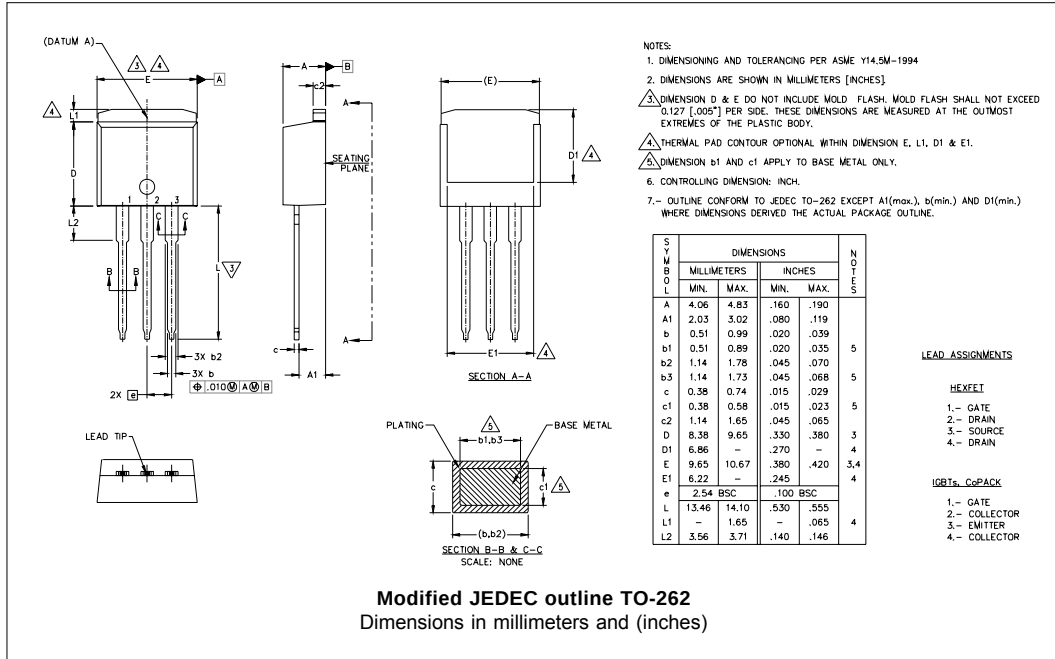
P_d = Forward Power Loss = $I_{F(AV)} \times V_{FM} @ (I_{F(AV)} / D)$ (see Fig. 6);

$P_{d_{REV}}$ = Inverse Power Loss = $V_{R1} \times I_R (1 - D)$; $I_R @ V_{R1} = 10V$

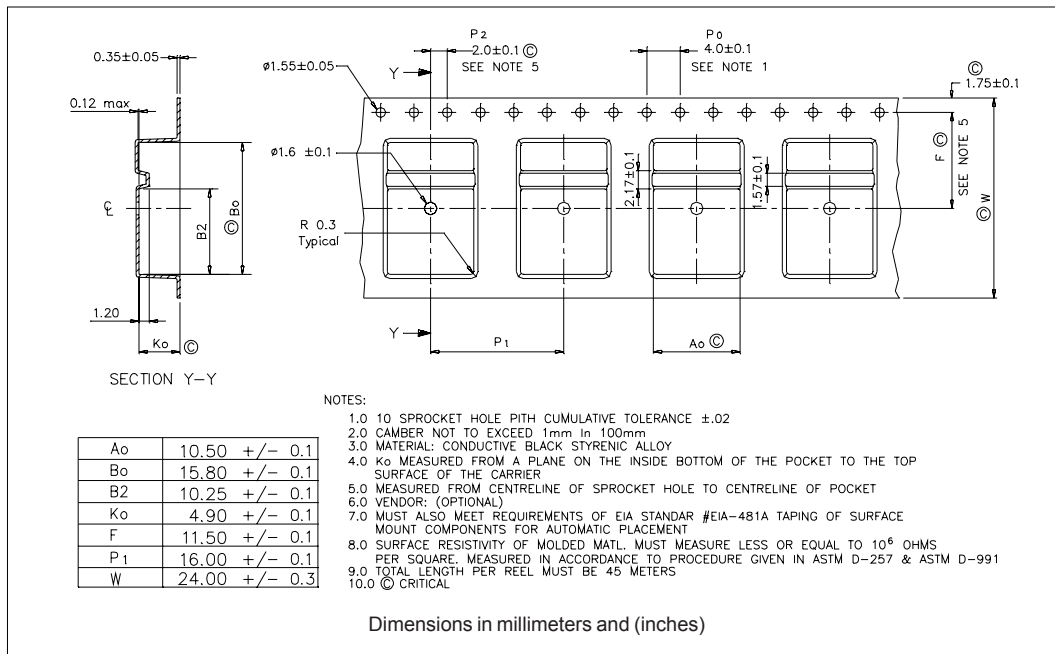
Outline Table



Outline Table



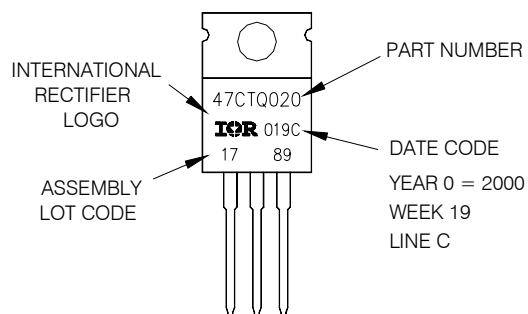
Tape & Reel Information



Part Marking Information

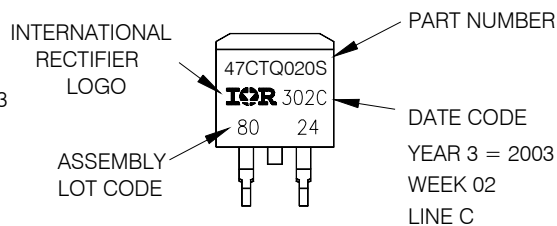
TO-220

EXAMPLE: THIS IS A 47CTQ020
LOT CODE 1789
ASSEMBLED ON WW 19, 2000
IN THE ASSEMBLY LINE "C"



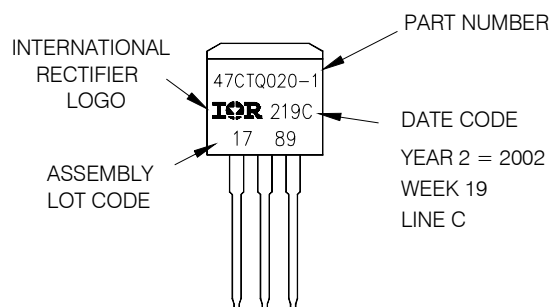
D²PAK

EXAMPLE: THIS IS A 47CTQ020S
LOT CODE 8024
ASSEMBLED ON WW 02, 2003
IN ASSEMBLY LINE "C"



TO-262

EXAMPLE: THIS IS A 473CTQ020-1
LOT CODE 1789
ASSEMBLED ON WW 19, 2002
IN ASSEMBLY LINE "C"



Ordering Information Table

Device Code							
	47	C	T	Q	020	S	TRL -
	1	2	3	4	5	6	7 8
1	-	Current Rating (40A)					
2	-	Circuit Configuration					
		C = Common Cathode					
3	-	T = TO-220					
4	-	Schottky "Q" Series					
5	-	Voltage Rating (020 = 20V)					
6	-	- S = D²Pak -1= TO-262					
7	-	- none = Tube (50 pieces) - TRL = Tape & Reel (Left Oriented - for D²Pak only) - TRR = Tape & Reel (Right Oriented - for D²Pak only)					
8	-	- none = Standard Production - PbF = Lead-Free					

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.

International
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