

JANTXVR4N47U/BU	OPTOCOUPLERS 6 PIN LCC Package RADIATION ASSURED	
JANTXVR4N48U/BU		
JANTXVR4N49U/BU		

09/30/2024

Features: • Certified to MIL-PRF-19500/548 • Devices still meet datasheet performance after the following Radiation tests: TID at 100 krad, 1-MeV Neutron fluence at 1x10¹² n/cm², and ELDRS at 100 krad • Hermetically Sealed for stability and reliability • Rugged packaging for harsh environments • Base lead provided for conventional transistor biasing, or for photodiode operation • 1000 V electrical isolation	Applications: • Space environment electronic systems • Eliminates ground loops with signal ground isolation • Level shifting • Line receiver • Switchmode Power Supplies • Motor control • Process Control input / output Isolation
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DESCRIPTION

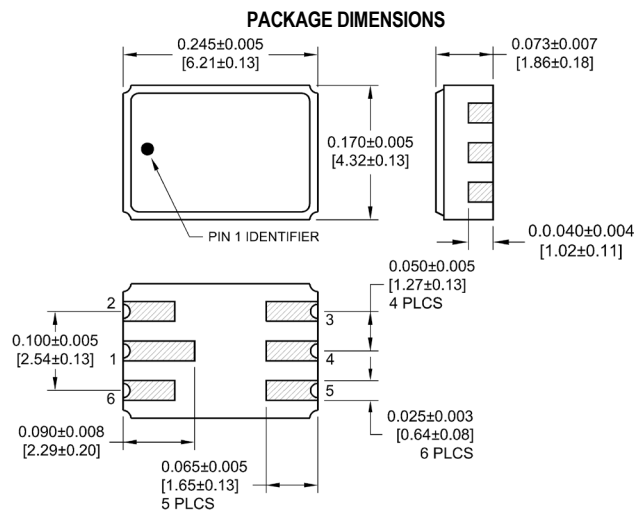
This high gain radiation assured optocoupler utilizes a GaAlAs infrared LED that is optically coupled to a NPN silicon phototransistor. These two components are packaged together in a hermetically sealed 6 pin leadless chip carrier (LCC). The **4N47U**, **4N47BU**, **4N48U**, **4N48BU**, **4N49U**, and **4N49BU** optocouplers are single channel devices that are supplied in JANTXVR quality level in compliance to military specification requirements. Radiation testing results are available for wafers used.

ABSOLUTE MAXIMUM RATINGS

Input to Output Isolation Voltage	±1000 V
Input LED Continuous Forward Current (Note 1)	40 mA
Input LED Power Dissipation	80 mW
Input LED Peak Forward Current (Value applies for tw ≤1μs, PRR < 300 pps)	1 A
Input LED Reverse Voltage	2 V
Collector-Emitter Voltage (Applies to emitter-base open-circuited & the input-diode equal to zero)	40 V
Collector-Emitter Voltage (Note 3) (Applies to emitter-base open-circuited & the input-diode equal to zero)	60 V
Collector-Base Voltage	45 V
Collector-Base Voltage (Note 3)	60 V
Emitter-Collector Voltage	7 V
Emitter-Base Voltage	7 V
Continuous Collector Current	50 mA
Continuous Transistor Power Dissipation (Note 2)	300 mW
Operating Free-Air Temperature Range	-55°C to +125°C
Storage Temperature Range	-65°C to +125°C
Lead Solder Temperature (10 seconds max.)	240°C

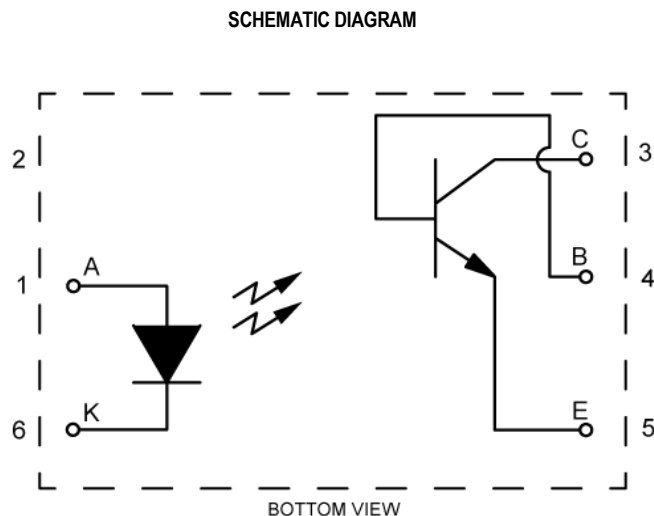
Notes:

1. Derate linearly to 125°C free-air temperature at the rate of 0.67 mA/°C above 65°C.
2. Derate linearly to 125°C free-air temperature at the rate of 3 mW/°C above 25°C.
3. Denotes the breakdown voltages only for the JANTXVR4N47BU, JANTXVR4N48BU, and JANTXVR4N49BU devices.



ALL DIMENSIONS ARE IN INCHES [MILLIMETERS]

Package Weight: 0.9 grams ± 0.05 grams
Lead Plating: Gold Plate 60 μin (1.524 μm) thick (typ.) over 120 μin (3.048 μm) thick (typ.) nickel plate



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9/30/24

ELECTRICAL CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise specified.

PARAMETER	SYMBOL	MIN	MAX	UNITS	TEST CONDITIONS	NOTE
Input Diode Static Reverse Current	IR		100	μA	$V_R = 2\text{ V}$	
Input Diode Static Forward Voltage	V_F	1.0	1.7	V	$I_F = 10\text{ mA}$	
-55°C		0.8	1.5			
+25°C		0.7	1.3			
+100°C						

OUTPUT TRANSISTOR $T_A = 25^\circ\text{C}$ unless otherwise specified.

PARAMETER	SYMBOL	MIN	MAX	UNITS	TEST CONDITIONS	NOTE
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	45		V	$I_C = 100\text{ }\mu\text{A}$, $I_B = 0$, $I_F = 0$	1
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	60		V	$I_C = 100\text{ }\mu\text{A}$, $I_B = 0$, $I_F = 0$	2
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40		V	$I_C = 1\text{ mA}$, $I_B = 0$, $I_F = 0$	1
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	60		V	$I_C = 1\text{ mA}$, $I_B = 0$, $I_F = 0$	2
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	7		V	$I_E = 100\text{ }\mu\text{A}$, $I_F = 0$	
Off-State Collector Current	$I_{C(OFF)}$		100	nA	$V_{CE} = 20\text{ V}$, $I_F = 0\text{ mA}$, $I_B = 0$	
Off-State Collector Current	$I_{C(OFF)}$		100	μA	$V_{CE} = 20\text{ V}$, $I_F = 0\text{ mA}$, $I_B = 0$	
+100°C						
DC Current Gain	H_{FE}	100			$V_{CE} = 5\text{ V}$, $I_C = 10\text{ mA}$	

NOTES:

- Denotes the breakdown voltages for the JANTXVR4N47U, JANTXVR4N48U, and JANTXVR4N49U devices
- Denotes the breakdown voltages for the JANTXVR4N47BU, JANTXVR4N48BU, and JANTXVR4N49BU device

COUPLED CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise specified.

PARAMETER	SYMBOL	MIN	MAX	UNITS	TEST CONDITIONS	NOTE
On State Collector Current	$I_{C(ON)1}$	0.5	5.0	mA	$V_{CE} = 5\text{ V}$, $I_F = 1\text{ mA}$, $I_B = 0$	
4N47U/BU		1.0				
4N48U/BU		2.0	10.0			
4N49U/BU						
On State Collector Current	$I_{C(ON)2}$	5.0		mA	$V_{CE} = 5\text{ V}$, $I_F = 10\text{ mA}$, $I_B = 0$	
ALL						
On State Collector Current	$I_{C(ON)3}$	0.5		mA	$V_{CE} = 5\text{ V}$, $I_F = 2\text{ mA}$, $I_B = 0$	
4N47U/BU		1.0				
+100°C		2.0				
4N48U/BU						
4N49U/BU						
On State Collector Current	$I_{C(ON)4}$	0.5		mA	$V_{CE} = 5\text{ V}$, $I_F = 2\text{ mA}$, $I_B = 0$	
4N47U/BU		1.0				
-55°C		2.8				
4N48U/BU						
4N49U/BU						
Current Transfer Ratio	CTR	50		%	$V_{CE} = 5\text{ V}$, $I_F = 1\text{ mA}$, $I_B = 0$	
4N47U/BU		100				
4N48U/BU		200				
4N49U/BU						
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$		0.3	V	$I_F = 2\text{ mA}$, $I_C = 0.5\text{ mA}$, $I_B = 0$	2
4N47U/BU			0.3		$I_F = 2\text{ mA}$, $I_C = 1\text{ mA}$, $I_B = 0$	
4N48U/BU			0.3		$I_F = 2\text{ mA}$, $I_C = 2\text{ mA}$, $I_B = 0$	
4N49U/BU						
Input to Output Internal Resistance	R_{IO}	10^{11}		Ω	$V_{I-O} = \pm 1000\text{ V}$	1
ALL						
Input to Output Capacitance	C_{IO}		5	pF	$f = 1\text{ MHz}$, $V_{I-O} = 0\text{ V}$	1
ALL						
Rise Time	t_r		20	μs	$V_{CC} = 10\text{ V}$, $I_F = 5\text{ mA}$, $R_L = 100\text{ }\Omega$, $I_B = 0$	
Phototransistor Operation						
ALL						
Fall Time	t_f		20	μs	$V_{CC} = 10\text{ V}$, $I_F = 5\text{ mA}$, $R_L = 100\text{ }\Omega$, $I_B = 0$	
Phototransistor Operation						
ALL						
Rise Time	t_r		3	μs	$V_{CC} = 10\text{ V}$, $I_F = 5\text{ mA}$, $R_L = 100\text{ }\Omega$, $I_B = 0$	
Photodiode Operation						
ALL						
Fall Time	t_f		3	μs	$V_{CC} = 10\text{ V}$, $I_F = 5\text{ mA}$, $R_L = 100\text{ }\Omega$, $I_B = 0$	
Photodiode Operation						
ALL						

NOTES:

- These parameters are measured between all phototransistor leads shorted together and with both input diode leads shorted together.
- This parameter must be measured using pulse techniques ($t_w = 100\text{ }\mu\text{s}$ duty cycle $\leq 1\%$).

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MICROPAC INDUSTRIES, INC. • 1655 STATE HWY 66, GARLAND, TEXAS 75040 • (972)272-3571 • Fax (972)487-6918

www.micropac.com E-MAIL: OPTOSALES@MICROPAC.COM

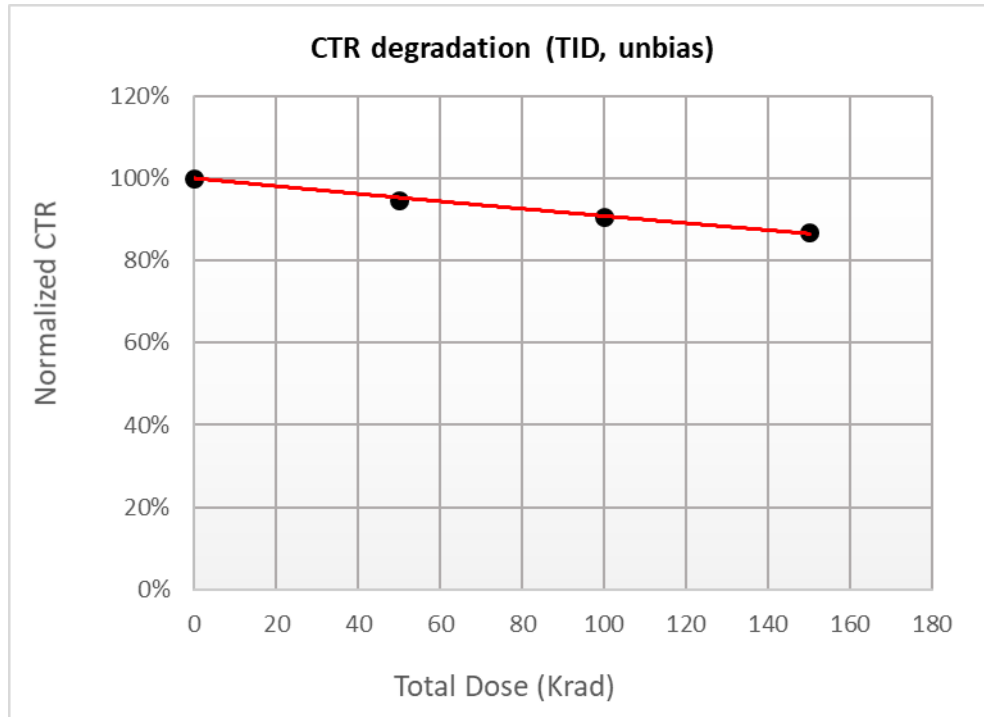
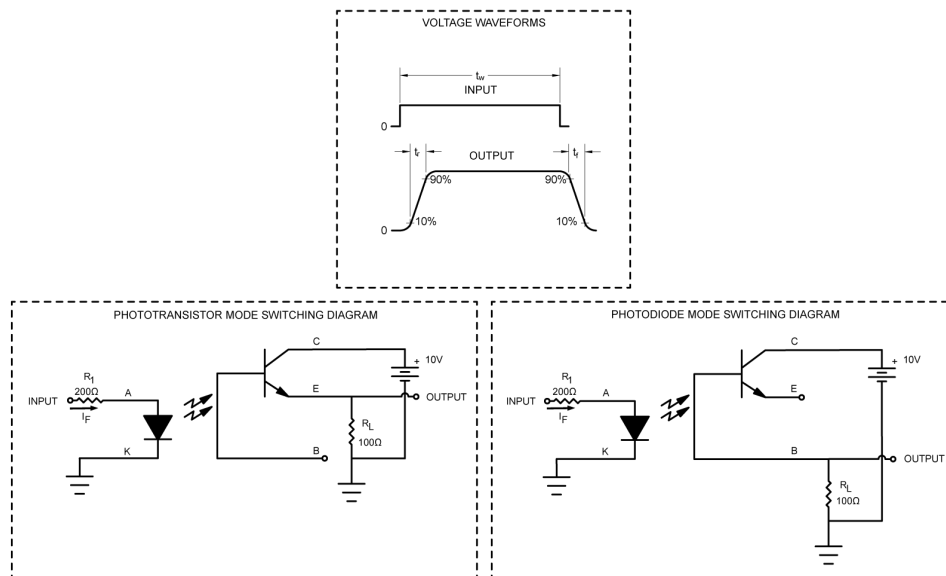
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RADIATION TEST DATA FROM WAFERS USED IN PRODUCTON AVAILABLE AS SUPPLEMENTAL OPTION

SUPPLEMENTAL OPTIONS:

1. **TID TESTING** follows MIL-STD-750, Test Method (TM) 1019, **Condition A**
2. **NEUTRON DISPLACEMENT DAMAGE TESTING** follows MIL-STD-750, Test Method (TM) 1017
3. **ELDRS TESTING** follows MIL-STD-750, Test Method (TM) 1019, **Condition D**

**JANTXVR4N49U RADIATION TEST DATA
CTR DEGRADATION FROM TID TESTING (UNBIASED)**

**TIMING DIAGRAMS**

SELECTION AND DEVICE ORDERING GUIDE

MICROPAC PART NUMBER	JEDEC PART NUMBER	PART DESCRIPTION
66224-187	JANTXVR4N47U	4N47U Optocoupler, JANTXVR Screening Level
66224-188	JANTXVR4N48U	4N48U Optocoupler, JANTXVR Screening Level
66224-189	JANTXVR4N49U	4N49U Optocoupler, JANTXVR Screening Level
66224-197	JANTXVR4N47BU	4N47BU Optocoupler, JANTXVR Screening Level
66224-198	JANTXVR4N48BU	4N48BU Optocoupler, JANTXVR Screening Level
66224-199	JANTXVR4N49BU	4N49BU Optocoupler, JANTXVR Screening Level

INCLUDED:

- Certificate of Compliance
- Gold Leads as Standard Finish
- Waffle Pack as Standard Delivery Packaging
- Testing and Inspection per MIL-PRF-19500:
 - QCI-Group A testing (not serialized, not parametric value)
 - QCI-Group B testing (not serialized, not parametric value)
 - Periodic QCI-Group C testing
 - Burn-in
- Attributes data report in compliance with MIL-PRF-19500 which includes information for:
 - QCI-Group A (not serialized, not parametric value)
 - QCI-Group B (not serialized, not parametric value)
 - Periodic QCI-Group C
- Wafer Lot Specific Group D Radiation TID Parametric Test Results

SUPPLEMENTAL OPTIONS:

1. Lead Solder Dip
2. Particle Impact Noise Detection: PIND for MIL-STD-750, Test method 2052
3. Tape and Reel
4. Data Book Package:
 - QCI-Group A tests results – attribute (not serialized, not parametric value)
 - QCI-Group B tests results – attribute (not serialized, not parametric value)
 - Periodic QCI-Group C Data
 - Burn-In
5. Wafer Lot Specific Group D Radiation TID Parametric Test Results
6. Wafer Lot Specific Radiation Test Data for ELDRS
7. Wafer Lot Specific Radiation Test Data for Neutron