

66099

RADIATION TOLERANT OPTOCOUPLER

Mii

**OPTOELECTRONIC PRODUCTS
DIVISION**

Features:

- Meets or exceeds MIL-PRF-19500 radiation requirements
- Current Transfer Ratio-150% typical
- 1kVdc electrical input to output isolation
- Base lead provided for conventional transistor biasing

Applications:

- Eliminate ground loops
- Level shifting
- Line receiver
- Switching power supplies
- Motor control

DESCRIPTION

Radiation tests performed on the **66099** optocoupler have shown that the electrical performance of the device after irradiation is an order of magnitude better than the 4N49 optocouplers. The 66099 Optocoupler consists of a GaAlAs LED optically coupled to a photodiode detector circuit mounted in a hermetic TO-5 package. Figures 1 and 2 illustrate the radiation performance of the device. Micropac's 66099 performs beyond the levels shown in MIL-PRF-19500 for a level H (total dose >10⁶ rads, neutron fluence >1X10¹² n/cm²) RHA designation.

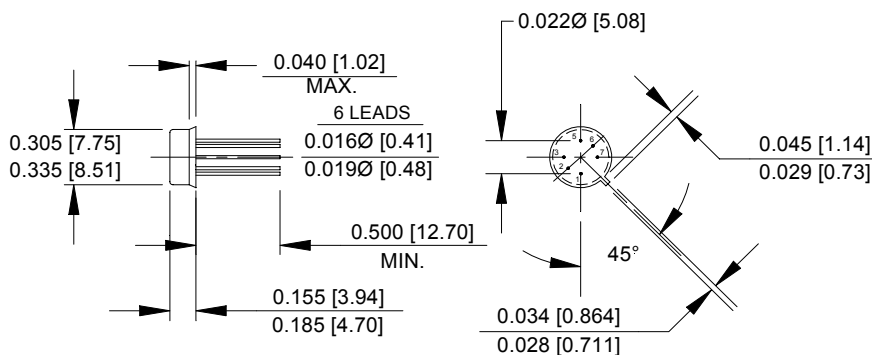
ABSOLUTE MAXIMUM RATINGS

Storage Temperature.....	-65°C to +150°C
Operating Free-Air Temperature Range	-55°C to +100°C
Lead Solder Temperature (1/16" (1.6mm) from case for 10 seconds)	240°C
Input Diode Forward DC Current.....	40mA
Input Power Dissipation (see Note 1)	80mW
Reverse Input Voltage	3V
Collector-Base Voltage	40V
Collector-Emitter Voltage	40V
Emitter-Base Voltage.....	4V
Continuous Collector Current	50mA
Continuous Transistor Power Dissipation (see Note 2)	300mW

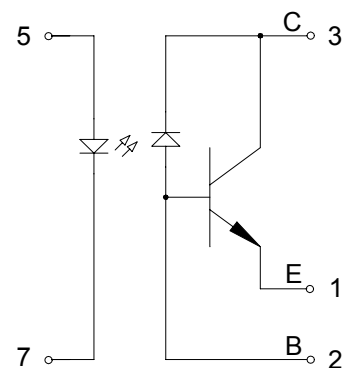
Notes:

1. Derate linearly 0.80 mW/°C above 25°C.
2. Derate linearly 3.0 mW/°C above 25°C.

Package Dimensions



Schematic Diagram



NOTE: ALL LINEAR DIMENSIONS ARE IN INCHES (MILLIMETERS)

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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Input Diode Static Reverse Current	I_R			100	μA	$V_R = 2\text{V}$
Input Diode Static Forward Voltage	V_F	0.8		2	V	$I_F = 10\text{mA}$

OUTPUT TRANSISTOR CHARACTERISTICS $T_A = 25^\circ\text{C}$ unless otherwise noted

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Collector-Base Breakdown Voltage	$V_{(BR)CBO}$	40			V	$I_C = 100\mu\text{A}, I_F = 0$
Collector-Emitter Breakdown Voltage	$V_{(BR)CEO}$	40			V	$I_C = 1\text{mA}, I_B = 0, I_F = 0$
Emitter-Base Breakdown Voltage	$V_{(BR)EBO}$	4			V	$I_C = 0\text{mA}, I_E = 100\mu\text{A}, I_F = 0$
Collector-Emitter Cutoff Current	I_{CEO}			100	nA	$V_{CE} = 20\text{V}$

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

PARAMETER	SYMBOL	MIN	TYP	MAX	UNITS	TEST CONDITIONS
Current Transfer Ratio	CTR	100			%	$V_{CE} = 1\text{V}, I_F = 10\text{mA}$
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$			0.3	V	$I_F = 20\text{mA}, I_C = 10\text{mA}$
Input-Output Isolation Current	I_{ISO}			100	nA	$V_{I-O} = 1000\text{V}$
Rise Time	t_r			20	μs	$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$
Fall Time	t_f			20	μs	$V_{CC} = 10\text{V}, I_F = 10\text{mA}, R_L = 100\Omega$

Figure 1: Mii Optocoupler Neutron Fluence Response

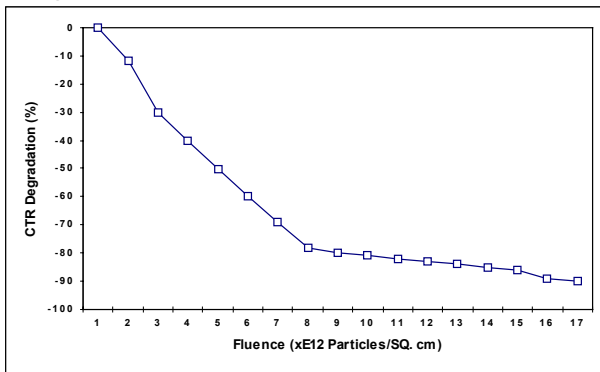
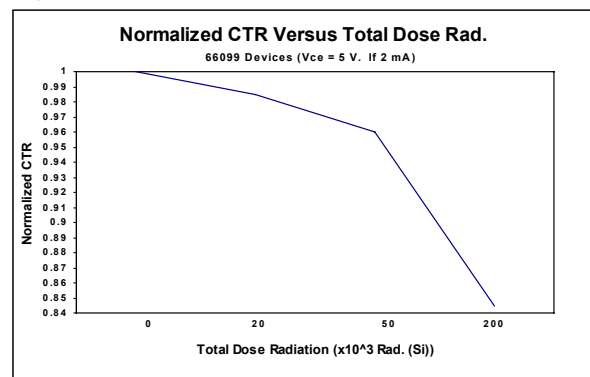


Figure 2: Mii Optocoupler Total Dose Radiation Response



RHA LEVEL DESIGNATOR	RADIATION AND TOTAL DOSE (rads)	LEVEL OF THE NEUTRON FLUENCE (n/cm ²)
/	No RHA	No RHA
M	3000	2×10^{12}
D	10^4	2×10^{12}
R	10^5	1×10^{12}
H	10^6	1×10^{12}

RECOMMENDED OPERATING CONDITIONS:

PARAMETER	SYMBOL	MIN	MAX	UNITS
Input Current, Low Level	I_{FL}	0	100	μA
Input Current, High Level	I_{FH}	10	20	mA
Operating Temperature	T_A	-55	100	$^\circ\text{C}$

SELECTION GUIDE

PART NUMBER	PART DESCRIPTION
66099-003	Single Channel Commercial Optocoupler (0 to 70°C)
66099-101	Single Channel Optocoupler with TX screening plus QCI (Group A, B & C)
66099-103	Single Channel Optocoupler with TX screening plus Group A
66099-105	Single Channel Optocoupler with TXV screening plus Group A