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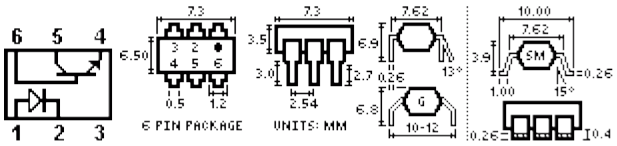
H11AV1X, H11AV2X, H11AV3X OPTICALLY COUPLED ISOLATOR TRANSISTOR OUTPUT

Circuit



0884 VDE FEATURES

Rated Impulse Voltage (Transient Overvoltage): V_{IOTM}=6 kVpeak
Insulation Test Voltage (Partial Discharge Test): V_{PD}=1.4 kVpeak
Rated Insulation Voltage (RMS includes d.c.): V_{IOWM}=600 VRMS (848 Vpeak)
Rated Recurring Peak Voltage (repetitive): V_{IORM}=600 VRMS
Isolation Materials: According to UL 94
Creeping Current Resistance: According to VDE 0303 Part 1/06.84 (IEC 112)
Climatic Classification: 55/100/21 (IEC 68 Part 1)
Comparative Tracking Index: CTI 275 (VDE 0109/12.83*)
Pollution Degree: 2 (VDE 0109/12.83*)
(*Identical with VDE 0110 Part 1/01.89)

Description

The H11 AV series are optically coupled isolators consisting of a Gallium Arsenide infrared emitting diode and an NPN silicon phototransistor mounted in a standard 6-pin dial-in-line package. Surface Mount Option Available.
The product type number consists of the basic product type followed by the letter "X" which indicates VDE

0884 approval of the basic part. Letter "X" supercedes letter "V" which denoted the now obsolete VDE 0883 approval.
For 10mm lead spread requirement add suffix G.
For surface mount requirements add suffix SM.

Applications

These couplers meet the requirements of the following Equipment Standards:
VDE 0109/12.83, VDE 0110/01.89:
Circuits for safe protective separation against electrical shock according to safety class II (reinforced isolation).
Application class I-IV at mains voltages <= 300V.
Application class I-III at mains voltages <= 600V.
VDE 0804/05.89:
Telecommunication Apparatus and Data Processing
VDE 0805/05.90 (IEC 950):
Data Processing Equipment and Office Machines (Option G only).
VDE 0860/05.89 (IEC 65):
Safety for mains-operated electronic and related apparatus for household.
UL 1577/09.89:
Standard for Safety Optical isolated switch systems. Package type K.
BS 415/1990; IEC 65/1985:
Safety requirements for mains-operated electronic and related apparatus for household and similar general use. Class II applications.
EN 60950/1989:
Specification for safety of information technology equipment including electrical business equipment (Option G only).

Absolute Maximum Ratings (Ta=25°C)

Storage Temperatare:	-55°C to +125°C
Operating Temperature:	-55°C to +125°C
Lead Soldering:	260°C for 10s, 2mm from case
Input-to-Output Insulation Test Voltage:	6kVpeak (Transient Overvoltage, t=10s)

Output Transistor

Collector-emitter Voltage BVceo:	70V
Emitter-base Voltage BVebo:	7V
Collector-base Voltage BVcbo:	70V
Collector Current:	50mA
Collector Current:	100mA (tp <= 10ms, Duty Ratio 0.5)
Power Dissipation:	150mW
Derate Linearly:	2.00mW/°C above 25°C

Input Diode

Forward DC Current:	60mA
Reverse DC Voltage:	6V
Peak Forward Current:	3A (1µs p.w. 300pps)
Power Dissipation:	100mW
Derate Linearly:	1.33mW/°C above 25°C

Package

Total Power Dissipation:	250mW
Derate Linearly:	3.3mW/°C above 25°C

0884 VDE Maximum Safety Ratings

Input Diode Isi:	130mA max
Output Transistor Psi:	265mW max

Coupled Device

Inpulse Voltage Viotm:	6kV MAX
Safety Temperature Tsi:	200°C

This device is suitable for safe electrical isolation *only* within the maximum safety ratings. This must be ensured by protective circuits in the applications.

Note

This device is suitable for safe electrical isolation only within the maximum safety ratings. This must be ensured by protective circuis in the applictions

Insulation Rated Parameters (15°C to 35°C, 45-75% RH u.o.s.)

PARAMETER	TEST CONDITIONS	MIN	MAX	UNIT
LOT SAMPLE TESTING				
Transient Overvoltage Rating (V_{IOTM})	Fig 1. V_{IOTM}=6kVpeak, T_{INI}=10s	No breakdown may occur		
Partial Discharge Measurement	Fig 1. V_{PD}=1.05kVpeak T_P=60s		5	pC
Insulation Resistance	V_{IO}=500Vdc, T_{AMB}=25°C	1E12		Ohm
	V_{IO}=500Vdc, T_{AMB}=100°C	1E11		Ohm
	V_{IO}=500Vdc, T_{SI}=200°C (construction test only)	1E9		Ohm
100% ROUTINE TESTING				
Partial Discharge Measurement	Fig 2. V_{PD}=1.4kVpeak, T_P=1s		5	pC

INPUT	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_F	Forward Voltage	I_F=10mA	0.8		1.5	V
		I_F=10mA, T_A=-55°C	0.9		1.7	V
		I_F=10mA, T_A=+100°C	0.7		1.4	V
I_R	Reverse Current	V_R=6.0V			10	µA
	Capacitance	V_R=0, f=1MHz		30		pF
OUTPUT						
BV_{CEO}	Collector-emitter Voltage	I_C=1mA	70			V
BV_{EBO}	Emitter-base Voltage	I_E=0.1mA	7			V
BV_{CBO}	Collector-base Voltage	I_C=0.1mA	70			V
I_{CEO}	Collector-emitter Dark Current	V_{CE}=10V, I_F=0			50	nA
C_{CE}	Collector-emitter Capacitance	V_{CE}=10V, f=1MHz		2		pF
COUPLED		**TEST CONDITIONS**	**MIN**	**TYP**	**MAX**	**UNIT**
I_C/I_F	DC Current Transfer Ratio	I_F=10mA, V_{CE}=10V				
	H11AV1X		100		300	%
	H11AV2X		50			%
	H11AV3X		20			%
R_{IO}	Input-to-Output Isolation Resistance	V_{IO}=500V, (Note 1)	1000			Gohm
$V_{CE(SAT)}$	Collector-emitter Saturation Voltage	I_F=20mA, I_C=2.0mA			0.4	V
C_{IO}	Capacitance Input to Output	f=1MHz, (Note 1)			0.5	pF
t_{ON}	Turn-on Time	V_{CC}=10V, I_C=2mA			15	µs
t_{OFF}	Turn-off Time	R_L=100ohm			15	µs

Notes

1. Measured with input leads shorted together and output leads shorted together

Isolation Characteristics

DESCRIPTION	SYMBOL	CHARACTERISTIC
Installation Category (DIN VDE0109, Dec 1983, Table 1)		I-IV I-III
IEC Climatic Category (DIN IEC 68 Part 1/09.80)		55/150/21
Pollution Degree (DIN VDE0109, Dec 1983)		2
Maximum Operating Isolation Voltage	V_{IORM}	630 V
Test Voltage Input/Output, Procedure B(1) V_{PR}=1.6 x V_{IORM}, Sample Test with t_P=1s, Partial Discharge<5pC	V_{PR}	1000 V
Test Voltage Input/Output, Procedure A(1) V_{PR}=1.2 x V_{IORM}, Type and Sampling Test with t_P=60s, Partial Discharge<5pC	V_{PR}	720 V
Maximum Permissable Overvoltage Transient Overvoltage, t_{TR}=10s, Procedure A(1)	V_{TR}	6000 V
Isolation Resistance, T_{SI} $V_{I/O}$=500V	R_{IS}	>=1 Gohm
Safety Maximum Ratings (max permissible ratings in case of a fault):		
Package Temperature	T_{SI}	175 °C
Current (I_F, P_{SI}=0)	I_{SI}	400 mA

Power (Output or Total Power Dissipation)	P_{SI}	700 mW

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