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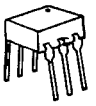
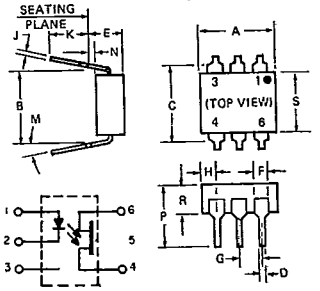
H11F1, H11F2, H11F3



Photon Coupled Bilateral Analog FET

The GE Solid State H11F family consists of a gallium arsenide infrared emitting diode coupled to a symmetrical bilateral silicon photo detector. The detector is electrically isolated from the input and performs like an ideal isolated FET designed for distortion-free control of low level ac and dc analog signals. The H11F series devices are mounted in a dual-in-line package. These devices are also available in Surface-Mount packaging.



FEATURES:

As a Remote Variable Resistor –
- ⩽ 100Ω to ⩾ 300MΩ
- ⩾ 99.9% Linearity
- ⩽ 15 pF Shunt Capacitance
- ⩾ 100GΩ I/O Isolation Resistance

As An Analog Signal Switch –
- Extremely Low Offset Voltage
- 60V pk-pk Signal Capability
- No Charge Injection or Latchup
- t_{on}, t_{off} ⩽ 15μsec.

SYMBOL	MILLIMETERS MIN.	MILLIMETERS MAX.	INCHES MIN.	INCHES MAX.	NOTES
A	8.38	8.89	.330	.350	
B	7.62 REF		300 REF.		1
C	–	8.64	–	.340	2
D	.406	.508	016	.020	
E	–	5.08	–	200	3
F	1.01	1.78	.040	070	
G	2.28	2.80	.090	.110	
H	–	2.16	–	085	4
J	.203	305	008	012	
K	2.54	–	.100	–	
M	–	15°	–	15°	
N	.381	–	.015	–	
P	–	9.53	–	.375	
R	2.92	3.43	.115	.135	
S	6.10	6.86	.240	.270	

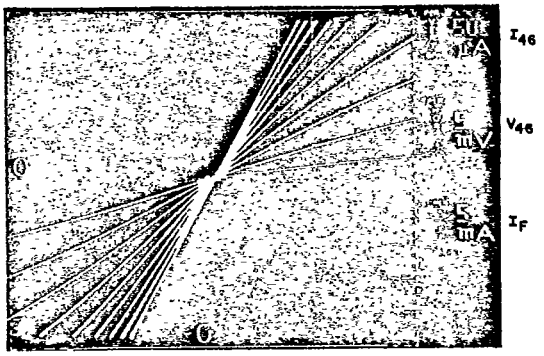
NOTES:
1. INSTALLED POSITION LEAD CENTERS.
2. OVERALL INSTALLED DIMENSION.
3. THESE MEASUREMENTS ARE MADE FROM THE SEATING PLANE.
4. FOUR PLACES.

Absolute Maximum Ratings: (25°C Unless Otherwise Specified)

INFRARED EMITTING DIODE		
Power Dissipation	T_A = 25°C	*150 milliwatts
Forward Current (Continuous)		60 milliamps
Forward Current (Peak) (Pulse Width 100μsec 100 pps)		500 milliamps
Forward Current (Peak) (Pulse Width 1μsec 300 pps)		3 amps
Reverse Voltage		6 volts
*Derate 2.0 mW/°C above 25°C.		

PHOTO DETECTOR		
Power Dissipation	T_A = 25°C	**300 milliwatts
Breakdown Voltage		
H11F1 – H11F2		± 30 volts
H11F3		± 15 volts
Detector Current (Continuous)		±100 milliamps
**Derate 4.0 mW/°C above 25°C.		

TOTAL DEVICE		
Storage Temperature		-55 to +150°C
Operating Temperature		-55 to +100°C
Lead Soldering Time (at 260°C),		10 Seconds
Surge Isolation Voltage (Input to Output)		
H11F1–H11F2	$3535V_{(PEAK)}$	$2500V_{(RMS)}$
Steady-State Isolation Voltage (Input to Output)		
H11F1–H11F2	$3180V_{(PEAK)}$	$2250V_{(RMS)}$



1. TYPICAL LOW LEVEL OUTPUT CHARACTERISTIC

Covered under U.L. component recognition program, reference file E51868

VDE Approved to 0883/6.80 0110b Certificate # 35025

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Individual Electrical Characteristics: (25°C Unless Otherwise Specified)

INFRARED EMITTING DIODE	TYP.	MAX.	UNITS
Forward Voltage (I_F = 16 mA)	1.1	1.75	volts
Reverse Current (V_R = 6V)	–	10	microamps
Capacitance (V = 0, f = 1 MHz)	50	–	picofarads

PHOTO-DETECTOR (Either Polarity)	MIN.	MAX.	UNITS
Breakdown Voltage–$V_{(BR)\,46}$ (I_{46} = 10μA; I_F = 0) – F1,2	30	–	volts
– F3	15	–	volts
Off-State Dark Current – I_{46} (V_{46}=15V; I_F=0; T_A = 25°C)	–	50	nanoamps
(V_{46}=15V; I_F=0; T_A=100°C)	–	50	microamps
Off-State Resistance – r_{46} (V_{46} = 15V; I_F = 0)	300	–	megohms
Capacitance – C_{46} (V_{46} = 0, I_F = 0, f = 1 MHz).	–	15	picofarads

Coupled Electrical Characteristics: (25°C)

		MIN.	TYP.	MAX.	UNITS
On-State Resistance – r_{46} (I_F = 16mA, I_{46} = 100μA)	H11F1	–	–	200	ohms
	H11F2	–	–	330	ohms
	H11F3	–	–	470	ohms
On-State Resistance – r_{64} (I_F = 16 mA, I_{64} = 100μA)	H11F1	–	–	200	ohms
	H11F2	–	–	330	ohms
	H11F3	–	–	470	ohms
Isolation Resistance (Input to Output) (V_{IO}= 500V)		100	–	–	gigohms
Input to Output Capacitance (V_{IO} = 0, f = 1 MHz)		–	–	2	picofarads
Turn-On Time – t_{on} (I_F = 16mA, R_L = 50Ω, V_{46} = 5V)		–	–	15	microseconds
Turn-Off Time – t_{off} (I_F = 16mA, R_L = 50Ω, V_{46} = 5V)		–	–	15	microseconds
Resistance, Non-Linearity and Asymmetry (I_F = 16mA, i_{46} = 25μA RMS, f = 1 KHz)		–	–	0.1	percent

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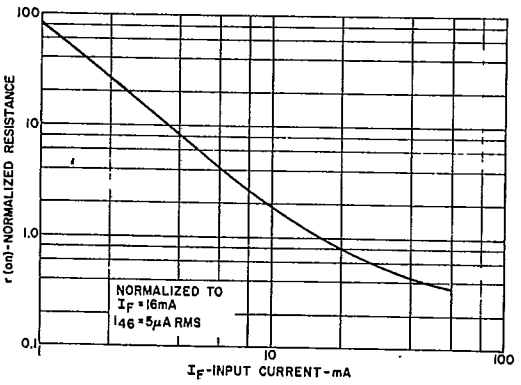
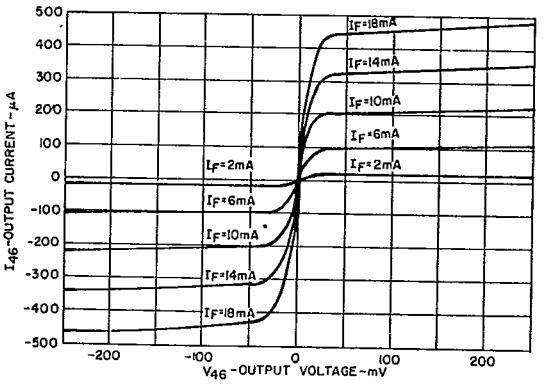
TYPICAL CHARACTERISTICS (25°C) – EITHER POLARITY



2. RESISTANCE VS. INPUT CURRENT



3. OUTPUT CHARACTERISTICS

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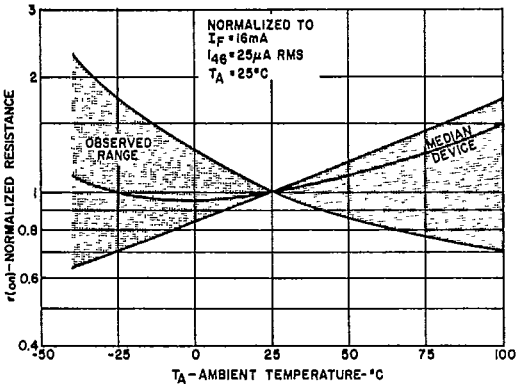
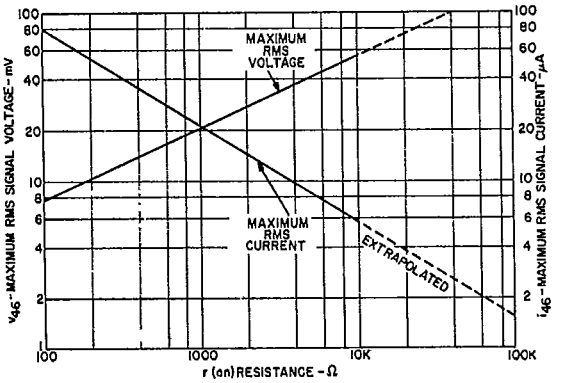
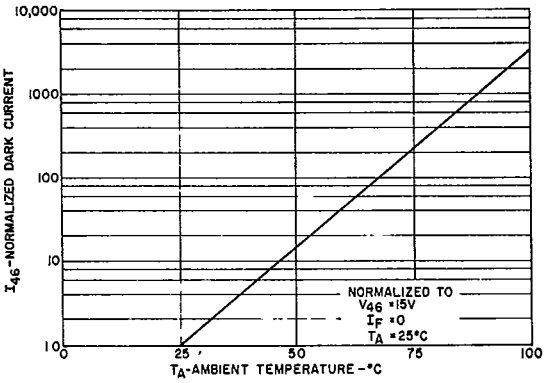


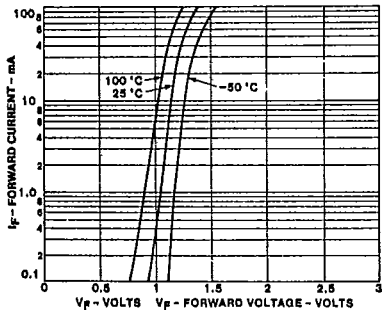
4. RESISTANCE VS. TEMPERATURE



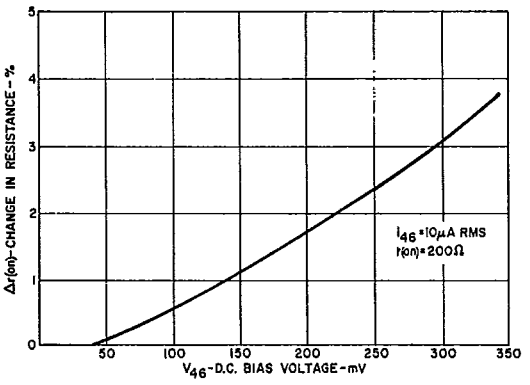
5. REGION OF LINEAR RESISTANCE



6 OFF-STATE CURRENT VS. TEMPERATURE



7. FORWARD VOLTAGE VS. FORWARD CURRENT



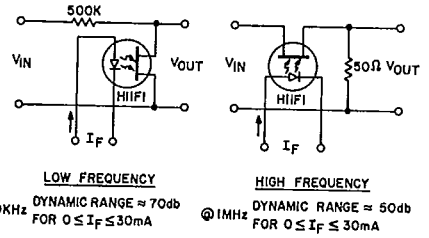
8. RESISTIVE NON-LINEARITY VS. D.C. BIAS

2761 A-12

TYPICAL APPLICATIONS

AS A VARIABLE RESISTOR

ISOLATED VARIABLE ATTENUATORS

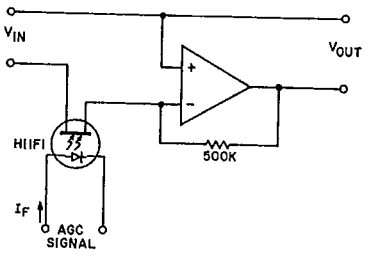


LOW FREQUENCY
@ 10KHz DYNAMIC RANGE ≈ 70db FOR 0 ≤ I_F ≤ 30mA

HIGH FREQUENCY
@ 1MHz DYNAMIC RANGE ≈ 50db FOR 0 ≤ I_F ≤ 30mA

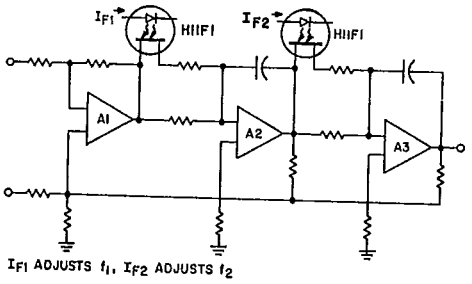
Distortion free attenuation of low level A.C. signals is accomplished by varying the IRED current, I_F. Note the wide dynamic range and absence of coupling capacitors; D.C. level shifting or parasitic feedback to the controlling function.

AUTOMATIC GAIN CONTROL



This simple circuit provides over 70db of stable gain control for an AGC signal range of from 0 to 30mA. This basic circuit can be used to provide programmable fade and attack for electronic music and can be modified with six components to a high performance compression amplifier.

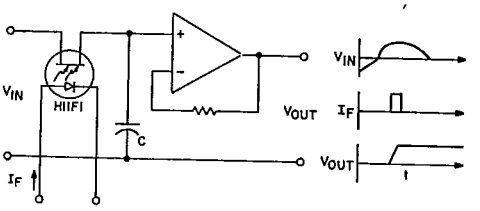
ACTIVE FILTER FINE TUNING/BAND SWITCHING



The linearity of resistance and the low offset voltage of the H11F allows the remote tuning or band-switching of active filters without switching glitches or distortion. This schematic illustrates the concept, with current to the H11F1 IRED's controlling the filter's transfer characteristic.

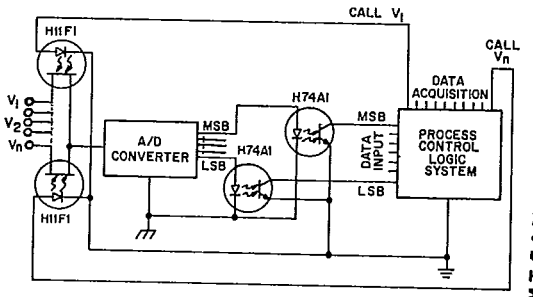
AS AN ANALOG SIGNAL SWITCH

ISOLATED SAMPLE AND HOLD CIRCUIT



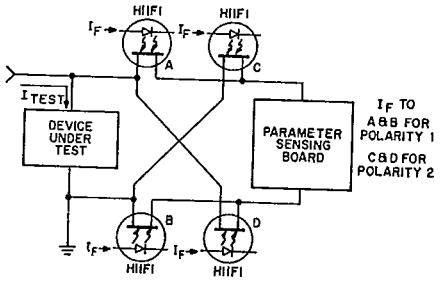
Accuracy and range are improved over conventional FET switches because the H11F has no charge injection from the control signal. The H11F also provides switching of either polarity input signal up to 30V magnitude.

MULTIPLEXED, OPTICALLY-ISOLATED A/D CONVERSION



The optical isolation, linearity and low offset voltage of the H11F allows the remote multiplexing of low level analog signals from such transducers as thermocouplers, Hall effect devices, strain gauges, etc. to a single A/D converter.

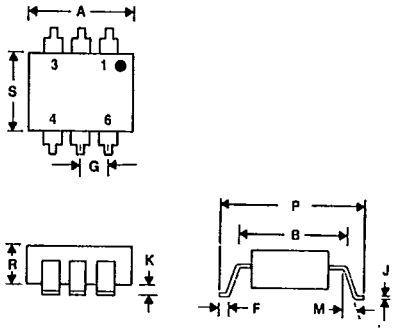
TEST EQUIPMENT – KELVIN CONTACT POLARITY



In many test equipment designs the auto polarity function uses reed relay contacts to switch the Kelvin Contact polarity. These reeds are normally one of the highest maintenance cost items due to sticking contacts and mechanical problems. The totally solid-state H11F eliminates these troubles while providing faster switching.

T-91-20

Surface-Mount Optoisolators



Surface-mount packaging for the entire 6-pin DIP opto-isolator line!

Add the "SMA" or "SMB" suffix to any 6-pin optoisolator part number when ordering.

DIMENSIONAL OUTLINE NO. 298
All Surface-Mount Types

SMB (Standard)
Surface-Mount Package

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	0.330	0.350	8.38	8.89	
B	0.330 REF		8.38 REF		
F	0.020	0.040	0.508	1.02	
J	0.008	0.012	0.203	0.305	
K	0.0040	0.0098	0.102	0.249	
M	—	15°	—	15°	
P	0.375	0.395	9.53	10.03	
R	0.115	0.135	2.92	3.43	
S	0.240	0.270	6.10	6.86	
Coplanarity	0	0.002	0	0.051	1

92CS-42862

1. Coplanarity is the distance from a plane, defined by the end of the three longest legs to the end of the shortest leg.

SMA (Low Profile)
Surface-Mount Package

SYMBOL	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	0.330	0.350	8.38	8.89	
B	0.330 REF		8.38 REF		
F	0.020	0.040	0.508	1.02	
J	0.008	0.012	0.203	0.305	
K	0.0005	0.0040	0.013	0.102	
M	—	15°	—	15°	
P	0.373	0.393	9.47	9.98	
R	0.115	0.135	2.92	3.43	
S	0.240	0.270	6.10	6.86	
Coplanarity	0	0.002	0	0.051	1

92CS-42861

1. Coplanarity is the distance from a plane, defined by the end of the three longest legs to the end of the shortest leg.