

## LOW POWER GROUND FAULT INTERRUPTER

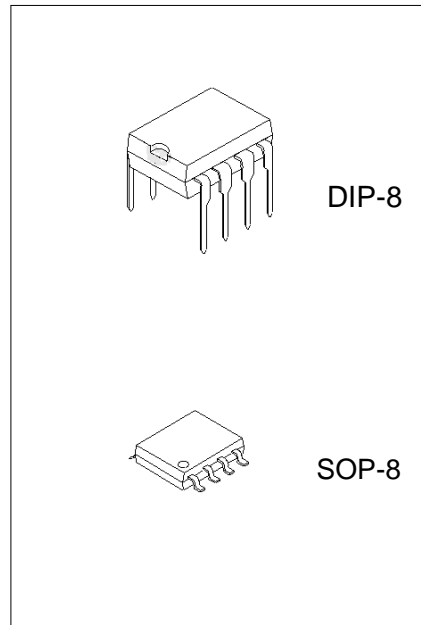
### DESCRIPTION

The HT4145A is a low power controller for AC outlet ground fault interrupters. These devices detect hazardous grounding conditions, such as equipment (connected to opposite phases of the AC line) in contact with a pool of water and open circuits the line before a harmful or lethal shock occurs.

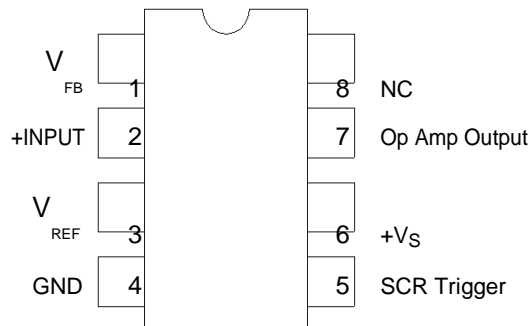
Contained internally are a 26V zener shunt regulator, an opamp, and an SCR driver. With the addition of two sense transformers, a bridge rectifier, an SCR, a relay, and a few additional components, the HT4145A will detect and protect against both hot wire to ground and neutral wire to ground faults. Ease of application and long-term reliability.

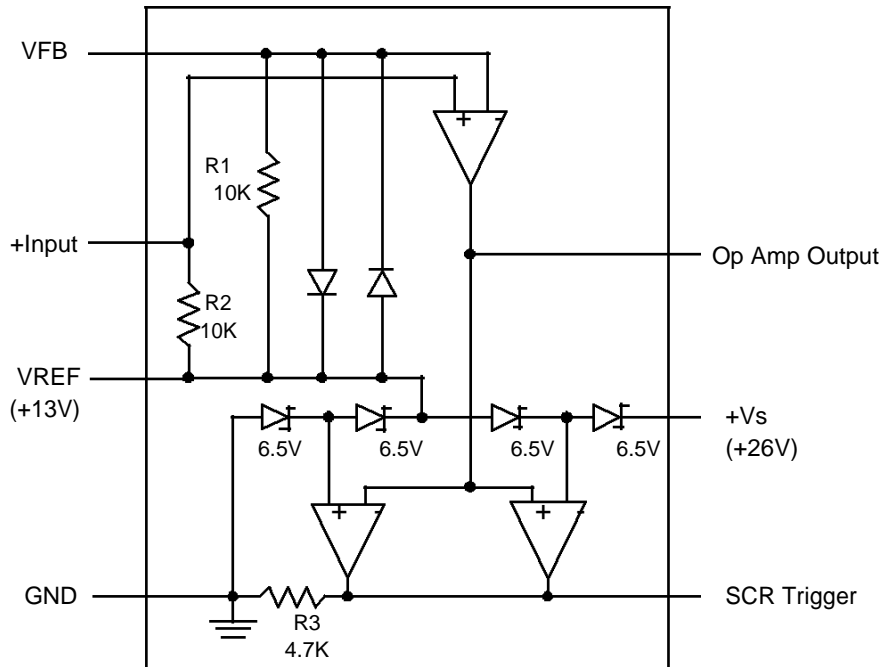
### FEATURES

- \*No potentiometer required
- \*Direct interface to SCR
- \*Supply voltage derived from AC line-26V shunt
- \*Adjustable sensitivity
- \*Grounded neutral fault detection
- \*Meets U.L.943 standards
- \*450 $\mu$ A quiescent current
- \*Ideal for 120V or 220V systems



### PIN CONFIGURATION




**ABSOLUTE MAXIMUM RATINGS**

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Current	I <sub>CC</sub>	18	mA
Power Dissipation	P <sub>D</sub>	500	mW
Storage Temperature Range	T <sub>stg</sub>	-65~+150	°C
Operating Temperature Range	T <sub>opr</sub>	-35~+85	°C
Junction Temperature	T <sub>J</sub>	125	°C
Lead Soldering Temperature			
DIP-8 (60 Sec)	T <sub>LED</sub>	300	°C
SOP-8 (10 Sec)		260	°C
PD TA <50°C			
DIP-8	P <sub>D</sub>	468	mW
SOP-8		300	mW
For TA >50°C Derate at			
DIP-8	P <sub>D</sub>	6.25	mW/°C
SOP-8		4.1	mW/°C

**THERMAL DATE**

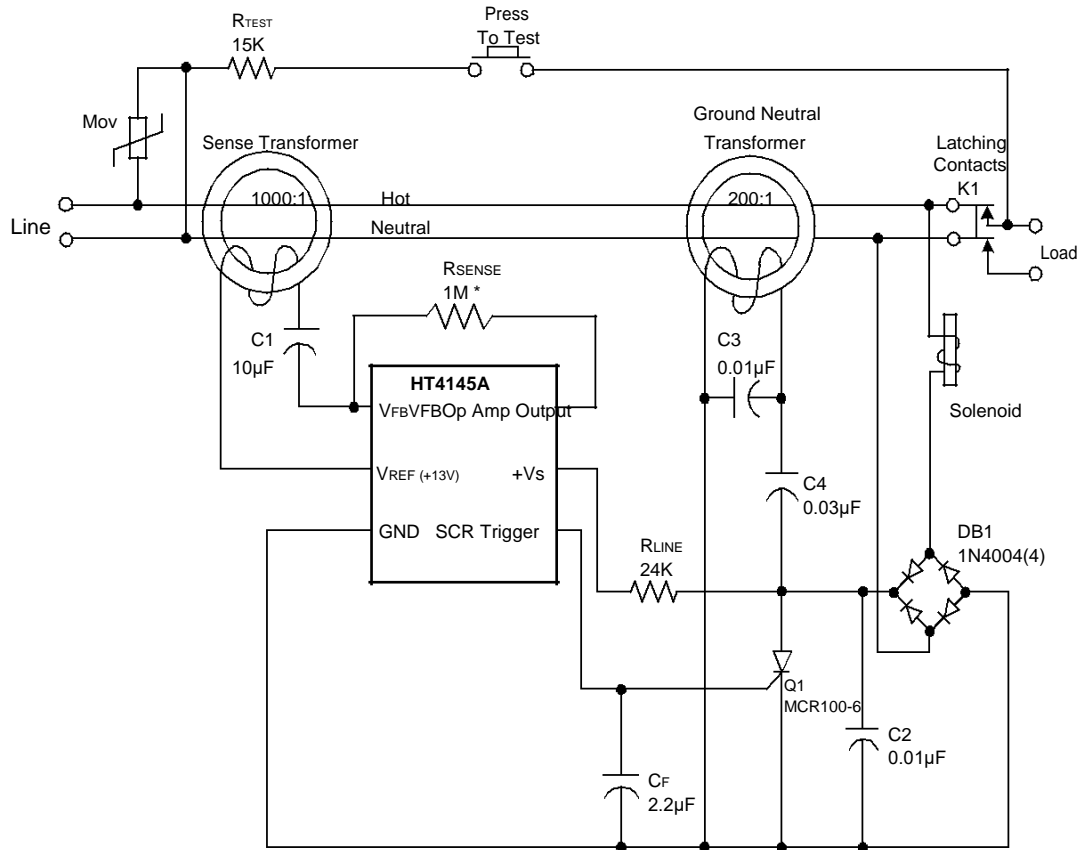
PARAMETER	SYMBOL	VALUE	UNIT
Thermal resistance	DIP-8 SOP-8	$\theta_{JA}$	160
			240
			$^{\circ}\text{C/W}$

**ELECTRICAL CHARACTERISTICS ( $T_a=25^{\circ}\text{C}$ ,  $I_s=1.5\text{mA}$ )**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detector Reference Voltage	$V_{REF(DET)}$	Pin 7 to Pin 3	6.8	7.2	8.1	$\pm\text{V}$
Shunt Regulator						
Zener Voltage	$V_Z$	Pin 6 to Pin 4	25	26	29.2	V
Reference Voltage	$V_{REF}$	Pin 3 to Pin 4	12.5	13	14.6	V
Quiescent Current	$I_Q$	$+V_s=24\text{V}$		450	750	$\mu\text{A}$
Operational Amplifier						
Offset Voltage	$V_{OS}$	Pin 2 to Pin 3	-3.0	0.5	+3.0	mV
+Output Voltage Swing	$V_{OH}$	Pin 7 to Pin 3	6.8	7.2	8.1	V
- Output Voltage Swing	$V_{OL}$	Pin 7 to Pin 3	-9.5	-11.2	-13.5	V
+Output Source Current	$I_{O(SOURCE)}$	Pin 7 to Pin 3		650		$\mu\text{A}$
- Output Source Current	$I_{O(SINK)}$	Pin 7 to Pin 3		1.0		mA
Gain Bandwidth Product	GBW	$F=50\text{KHZ}$	1.0	1.8		MHz
R1 Resistors	R1	Pin 1 to Pin 3, $I_s=0\text{mA}$		10		K $\Omega$
R2 Resistors	R2	Pin 2 to Pin 3, $I_s=0\text{mA}$		10		K $\Omega$
R3 Resistors	R3	Pin 5 to Pin 4, $I_s=0\text{mA}$	3.5	4.7	5.9	K $\Omega$
SCR Trigger Voltage Detector On	$V_{ON(SCR)}$	Pin 5 to Pin 4	1.5	2.8		V
SCR Trigger Voltage Detector Off	$V_{OFF(SCR)}$	Pin 5 to Pin 4	0	1	10	mV

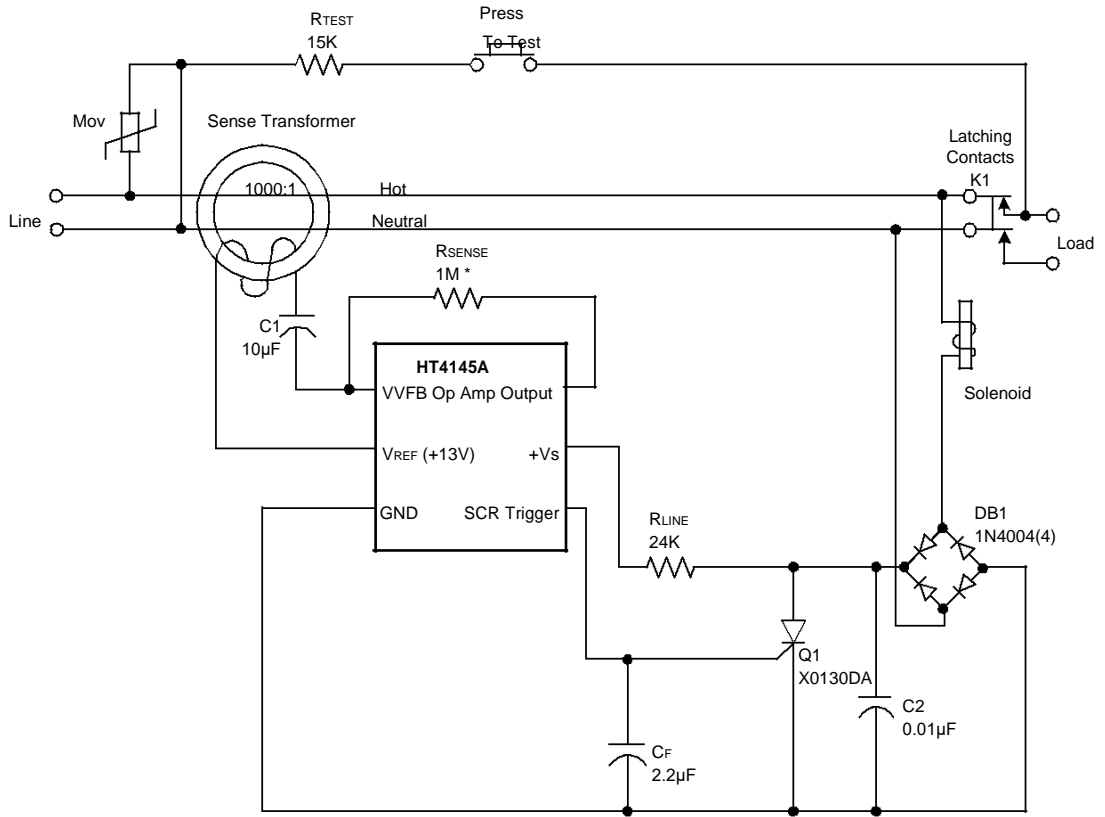
**ELECTRICAL CHARACTERISTICS ( $-35^{\circ}\text{C} \leq T_a \leq +85^{\circ}\text{C}$ ,  $I_s=1.5\text{mA}$ )**

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Detector Reference Voltage	$V_{REF(DET)}$	Pin 7 to Pin 3	6.5	7.2	8.3	$\pm\text{V}$
Shunt Regulator						
Zener Voltage	$V_Z$	Pin 6 to Pin 4	24	26	30	V
Reference Voltage	$V_{REF}$	Pin 3 to Pin 4	12	13	15	V
Quiescent Current( $I_s$ )	$I_Q$	$+V_s=23\text{V}$		500		$\mu\text{A}$
Operational Amplifier						
Offset Voltage	$V_{OS}$	Pin 2 to Pin 3	-5.0	0.5	+5.0	mV
+Output Voltage Swing	$V_{OH}$	Pin 7 to Pin 3	6.5	7.2	8.3	V
- Output Voltage Swing	$V_{OL}$	Pin 7 to Pin 3	-9.	-11.2	-14	V
Gain Bandwidth Product	GBW	$F=50\text{KHZ}$		1.8		MHz
Resistors R1	R1	Pin 1 to Pin 3, $I_s=0\text{mA}$		10		K $\Omega$
Resistors R2	R2	Pin 2 to Pin 3, $I_s=0\text{mA}$		10		K $\Omega$
Resistors R3	R3	Pin 5 to Pin 4, $I_s=0\text{mA}$	3.5	4.7	5.9	K $\Omega$
SCR Trigger Voltage Detector On	$V_{ON(SCR)}$	Pin 5 to Pin 4	1.3	2.8		V
SCR Trigger Voltage Detector Off	$V_{OFF(SCR)}$	Pin 5 to Pin 4	0	3	50	mV



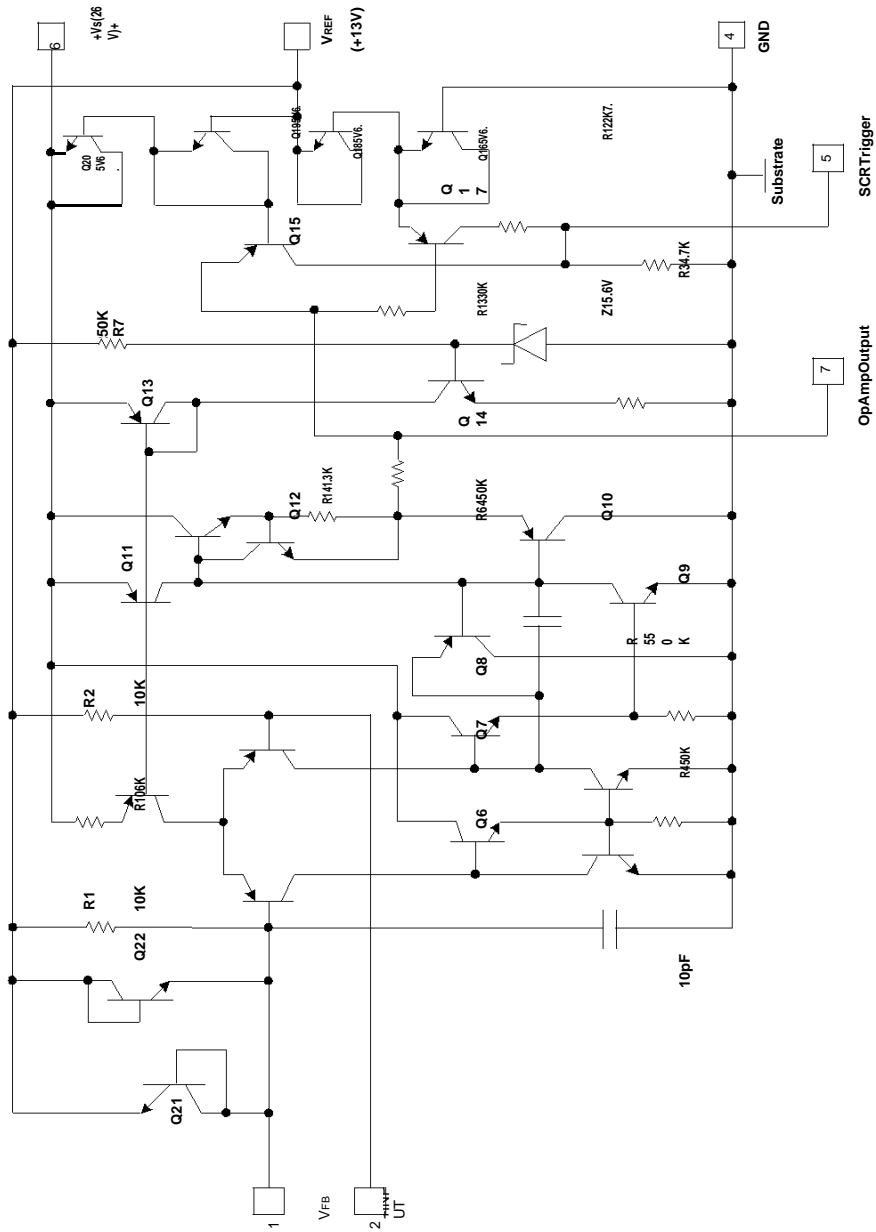
\* Value depends on transformer characteristics.

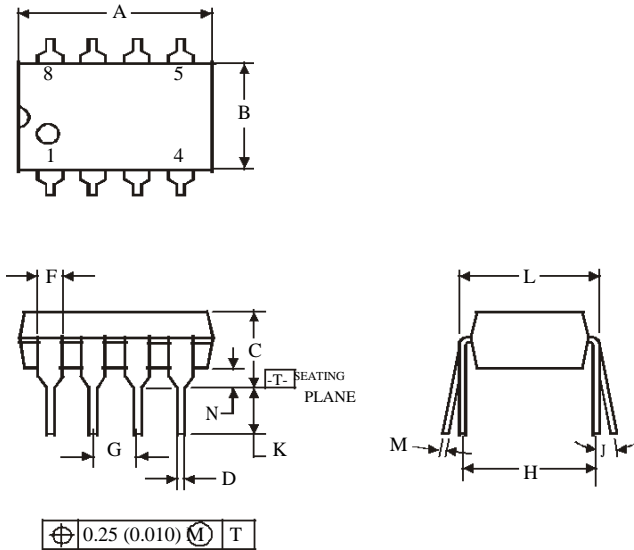
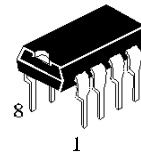
FIGURE 1. GFI Application Circuit (Three-Wire Outlet)



\* Value depends on transformer characteristics.

FIGURE 2. GFI Application Circuit ( Two-Wire Outlet)

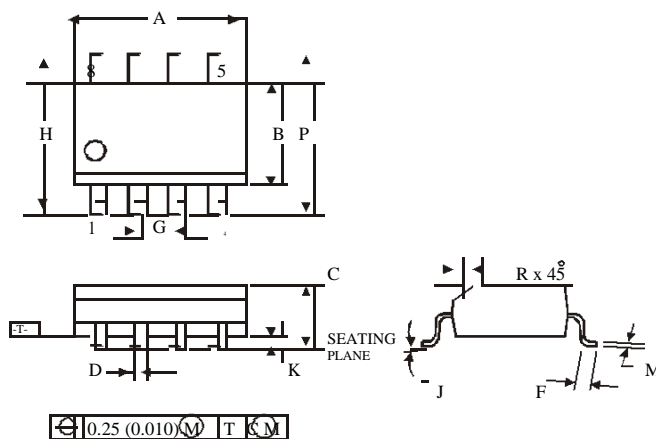
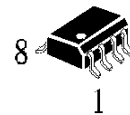


**(DIP8)**


Symbol	Dimension, mm	
	MIN	MAX
A	8.51	10.16
B	6.1	7.11
C		5.33
D	0.36	0.56
F	1.14	1.78
G	2.54	
H	7.62	
J	0°	10°
K	2.92	3.81
L	7.62	8.26
M	0.2	0.36
N	0.38	

**NOTES:**

- Dimensions "A", "B" do not include mold flash or protrusions.  
Maximum mold flash or protrusions 0.25 mm (0.010) per side.

**(SOP8)**


Symbol	Dimension, mm	
	MIN	MAX
A	4.8	5
B	3.8	4
C	1.35	1.75
D	0.33	0.51
F	0.4	1.27
G	1.27	
H	5.72	
J	0°	8°
K	0.1	0.25
M	0.19	0.25
P	5.8	6.2
R	0.25	0.5

**NOTES:**

- Dimensions A and B do not include mold flash or protrusion.
- Maximum mold flash or protrusion 0.15 mm (0.006) per side for A; for B - 0.25 mm (0.010) per side.