

### DESCRIPTION

M57962L-01R-02 is a hybrid integrated circuit designed for driving n-channel IGBT modules in any gate-amplifier application. This device operates as an isolation amplifier for these modules and provides the required electrical isolation between the input and output with an opto-coupler.

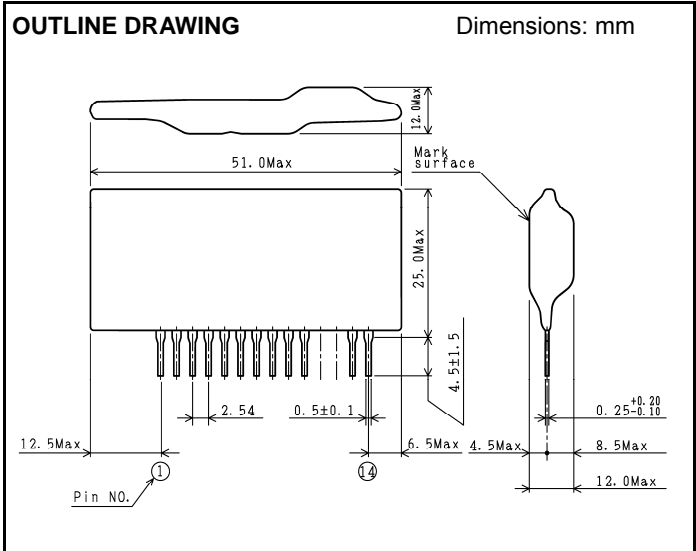
Recommended IGBT modules:

V<sub>CES</sub> = 600V series up to 600A class

V<sub>CES</sub> = 1200V series up to 400A class

### FEATURES

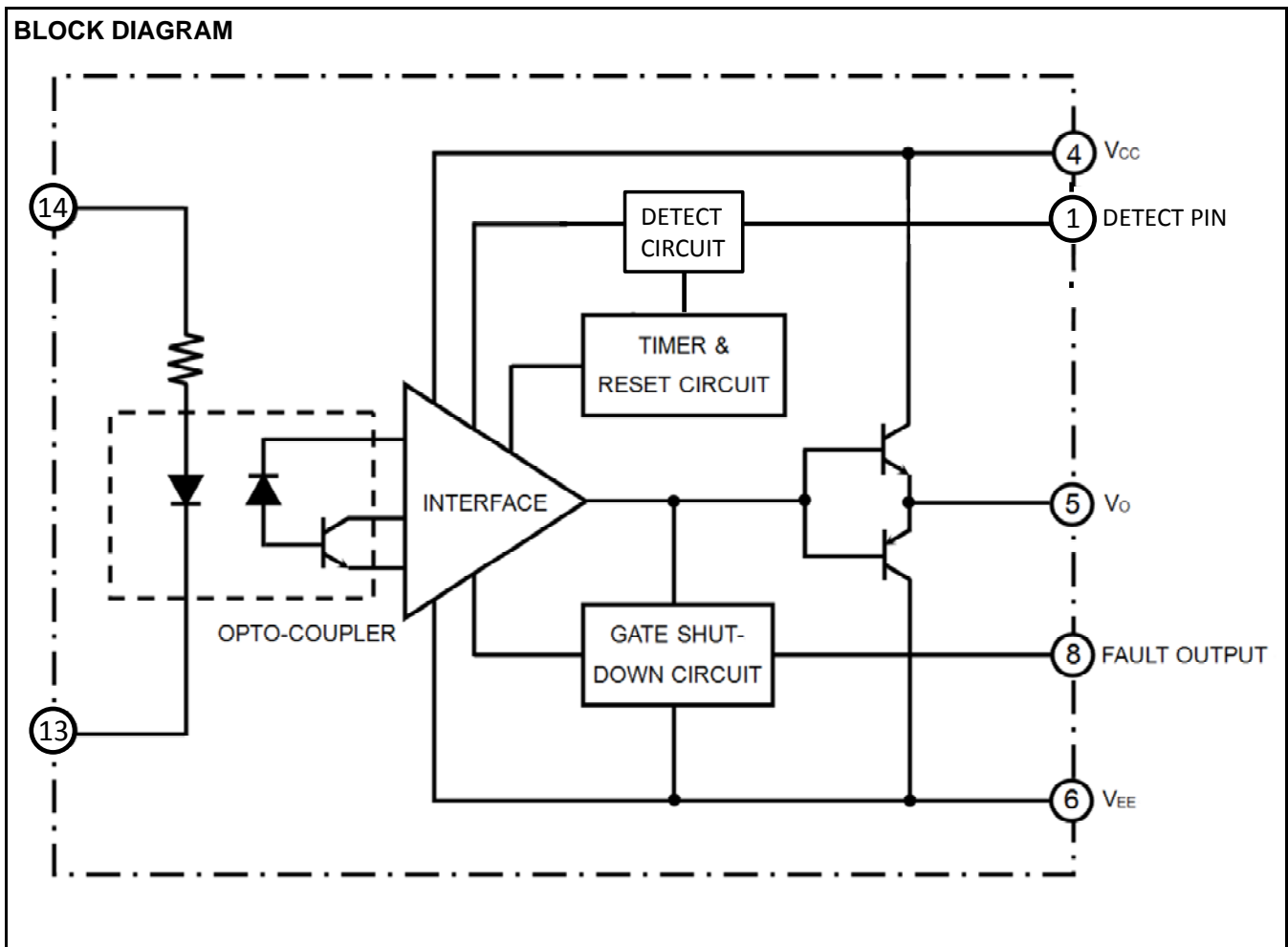
- Electrical isolation between input and output with opto-coupler  
(Viso = 2500Vrms for 1minute)
- Two supply driver topology
- Built-in short circuit protection circuit (With a pin for fault out)
- TTL compatible input interface



### APPLICATIONS

To drive IGBT modules for inverter or AC servo systems application

### BLOCK DIAGRAM



### MAXIMUM RATINGS (unless otherwise noted, Ta=25°C)

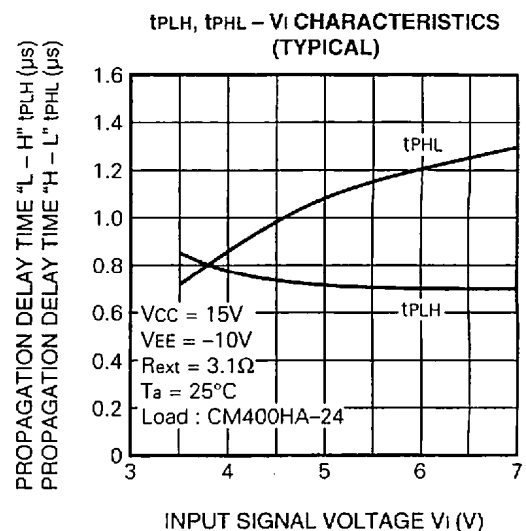
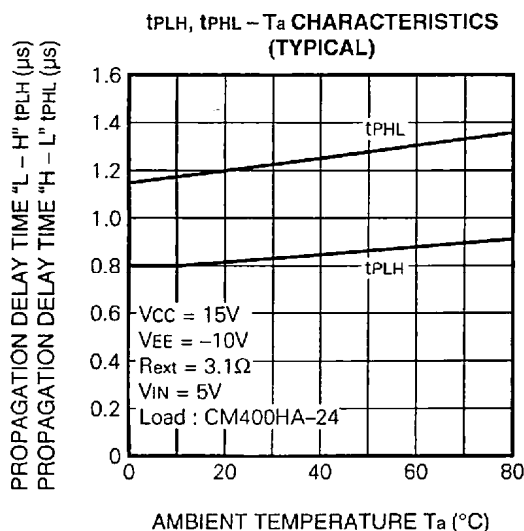
Symbol	Parameter	Conditions	Ratings	Unit
V <sub>CC</sub>	Supply voltage	DC	18	V
V <sub>EE</sub>			-15	V
V <sub>I</sub>	Input voltage	Applied between: 13pin and 14pin	-1 ~ +7	V
V <sub>O</sub>	Output voltage	When the output voltage is "H"	V <sub>CC</sub>	V
I <sub>OHP</sub>	Output current	Pulse width 2μs, f ≤ 20kHz	-5	A
I <sub>OLP</sub>			5	A
V <sub>iso</sub>	Isolation voltage	Sine wave voltage 60Hz, for 1min	2500	V <sub>rms</sub>
T <sub>C</sub>	Case temperature	-	85	°C
T <sub>opr</sub>	Operating temperature	No condensation allowable	-20 ~ +60	°C
T <sub>stg</sub>	Storage temperature	No condensation allowable	-25 ~ +100 (*1)	°C
I <sub>OH</sub>	Output current	DC	0.5	A
I <sub>FO</sub>	Fault output current	Applied 8pin	20	mA
V <sub>R1</sub>	Input voltage	Applied 1pin	50	V

(\*1) Differs from H/C condition

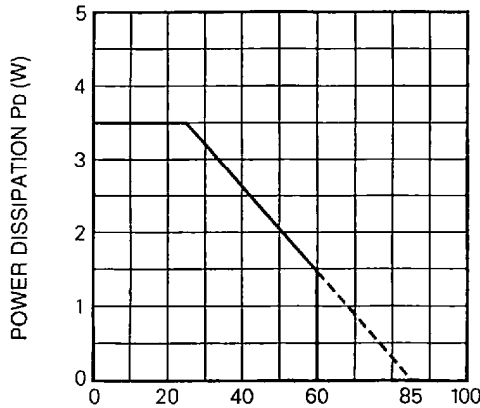
### ELECTRICAL CHARACTERISTICS (unless otherwise noted, Ta=25°C, V<sub>CC</sub> = 15V, V<sub>EE</sub> = -10V)

Symbol	Parameter	Conditions	Limits			Unit
			Min	Typ	Max	
V <sub>CC</sub>	Supply voltage	Recommended range	14	15	-	V
V <sub>EE</sub>			-7	-	-10	V
V <sub>IN</sub>	Pull-up voltage on input side	Recommended range	4.75	5	5.25	V
f	Switching frequency	Recommended range	-	-	20	kHz
I <sub>IH</sub>	"H" input current	V <sub>IN</sub> = 5V	-	16	-	mA
R <sub>G</sub>	Gate resistance	Recommended range	2	-	-	Ω
V <sub>OH</sub>	"H" output voltage	Recommended range	13	14	-	V
V <sub>OL</sub>	"L" output voltage	Recommended range	-8	-9	-	V
t <sub>PLH</sub>	"L-H" propagation time	I <sub>IH</sub> = 16mA	-	1	1.5	μs
t <sub>r</sub>	"L-H" rise time	I <sub>IH</sub> = 16mA	-	0.6	1	μs
t <sub>PHL</sub>	"H-L" propagation time	I <sub>IH</sub> = 16mA	-	1	1.5	μs
t <sub>f</sub>	"H-L" fall time	I <sub>IH</sub> = 16mA	-	0.4	1	μs
t <sub>timer</sub>	Timer	Between start and cancel (under input sign "L")	1	-	2	ms
I <sub>FO</sub>	Fault output current	Applied 8pin (With pull up 4.7kohm)	-	5	-	mA
V <sub>SC</sub>	SC detect voltage	Collector voltage of module	15	-	-	V

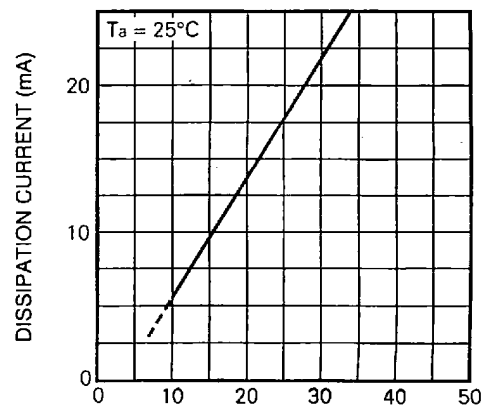
### TYPICAL CHARACTERISTICS



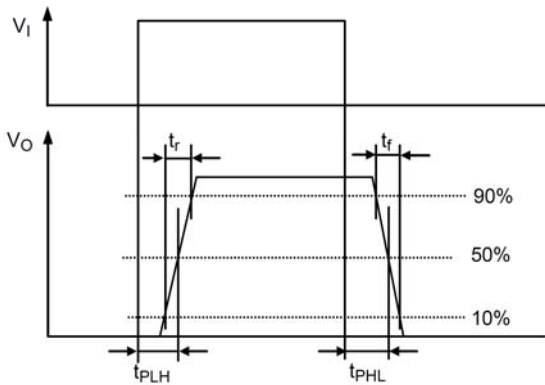
**POWER DISSIPATION VS. AMBIENT TEMPERATURE (MAXIMUM RATING)**



**DISSIPATION CURRENT VS. SUPPLY VOLTAGE INPUT SIGNAL "L" (TYPICAL)**



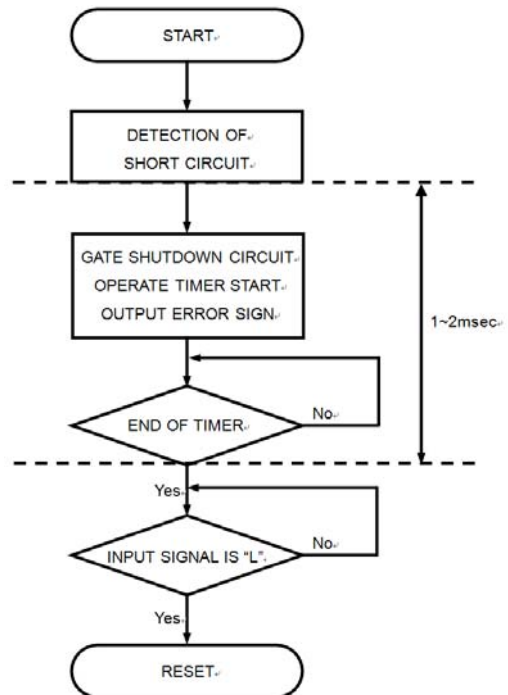
### DEFINITION OF CHARACTERISTICS



### OPERATION OF PROTECTION CIRCUIT

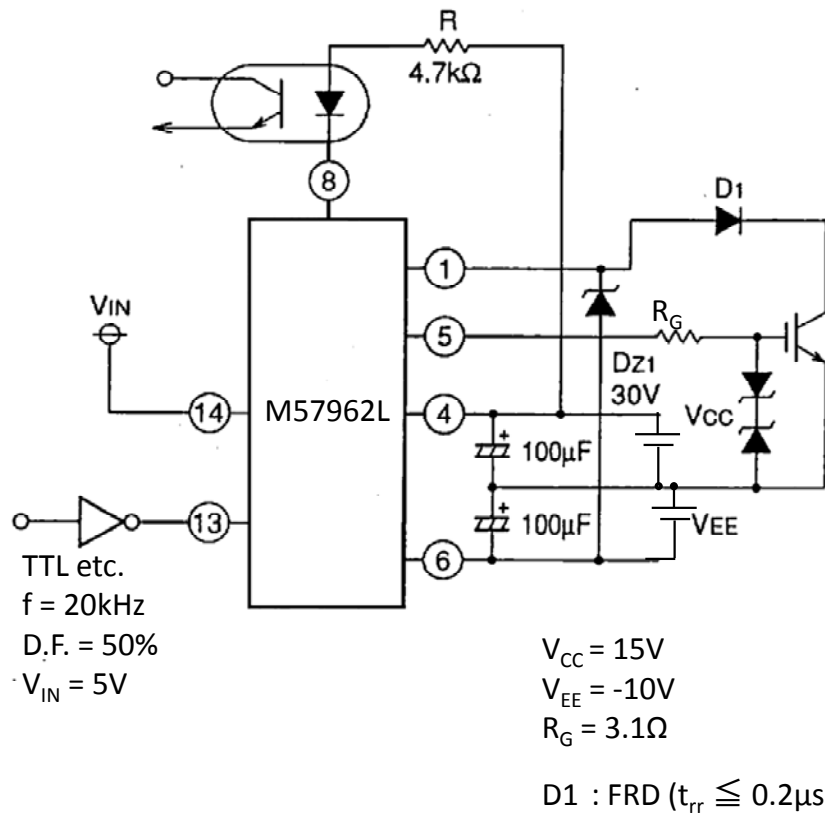
- (1) In case the gate voltage is "H" and the collector voltage is high, this hybrid IC will recognize the circuit as short circuit and immediately reduce the gate voltage. Besides, put out an error sign ("L") which inform that protection circuit is operating at the same time from 8pin.
- (2) The protection circuit reset and resorted to ordinary condition if input sign is "L" when the premised 1~2msec passed. ("L" period needs up to 5µs.)

### OPERATION FLOW ON DETECTING SHORT CIRCUIT



(\*) "L" output voltage with protection circuit operating is about  $|V_{EE}| + 2V$ .

## APPLICATION CIRCUIT EXAMPLE



### PRECAUTION

- (1) Because the pins 2,3,7,9 and 10pin are the pins connected between surface and back, the usage with electrical connections from the outside are not permitted.
- (2) If reverse recovery time of  $D_1$  is long, 1pin is applied high voltage. In that case, counterplan for protection which inserted a zener diode between 1 and 6pin are necessary like above diagram.
- (3) The hybrid IC will output fault sign ("L") until supply voltage become stable whether supply is ON or OFF.

### FOR SAFETY USING

Great detail and careful attention are given to the production activity of Hics, such as the development, the quality of production, and in its reliability. However the reliability of Hics depends not only on their own factors but also in their condition of usage. When handling Hics, please note the following cautions.

CAUTIONS	
Packing	<p>The materials used in packing Hics can only withstand normal external conditions. When exposed to outside shocks, rain and certain environmental contaminants, the packing materials will deteriorate. Please take care in handling.</p>
Carrying	<ol style="list-style-type: none"><li>1) Don't stack boxes too high. Avoid placing heavy materials on boxes.</li><li>2) Boxes must be positioned correctly during transportation to avoid breakage.</li><li>3) Don't throw or drop boxes.</li><li>4) Keep boxes dry. Avoid rain or snow.</li><li>5) Minimal vibration and shock during transportation is desirable.</li></ol>
Storage	<p>When storing Hics, please observe the following notices or possible deterioration of their electrical characteristics, risk of solder ability, and external damage may occur.</p> <ol style="list-style-type: none"><li>1) Devices must be stored where fluctuation of temperature and humidity is minimal, and must not be exposed to direct sunlight. Store at the normal temperature of 5 to 30 degrees Celsius with humidity at 40 to 60%.</li><li>2) Avoid locations where corrosive gasses are generated or where much dust accumulates.</li><li>3) Storage cases must be static proof.</li><li>4) Avoid putting weight on boxes.</li></ol>
Extended storage	<p>When extended storage is necessary, Hics must be kept non-processed. When using Hics which have been stored for more than one year or under severe conditions, be sure to check that the exterior is free from flaw and other damages.</p>
Maximum ratings	<p>To prevent any electrical damages, use Hics within the maximum ratings. The temperature, current, voltage, etc. must not exceed these conditions.</p>
Polarity	<p>To protect Hics from destruction and deterioration due to wrong insertion, make sure of polarity in inserting leads into the board holes, conforming to the external view for the terminal arrangement.</p>

**Keep safety first in your circuit designs!**

- ISAHAYA Electronics Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (1)placement of substitutive, auxiliary circuits, (2)use of non-flammable material or (3)prevention against any malfunction or mishap.

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