



### Hybrid Integrated Circuit For Driving IGBT Modules

#### Description:

M57959L 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. Short circuit protection is provided by a built in desaturation detector. A fault signal is provided if the short circuit protection is activated.

#### Features:

- Built in high CMRR opto-coupler ( $V_{CMR}$  : Typical 30kV/ $\mu\text{s}$ , Min. 15kV/ $\mu\text{s}$ )
- Electrical Isolation between input and output with opto-couplers ( $V_{ISO} = 2500$ ,  $V_{RMS}$  for 1 min.)
- TTL compatible input interface
- Two supply drive topology
- Built in short circuit protection circuit with a pin for fault output

#### Application:

To drive IGBT modules for inverter, AC Servo systems, UPS, CVCF inverter, and welding applications.

#### Recommended Modules:

$V_{CES} = 600\text{V Series}$   
(up to 200A Class)

$V_{CES} = 1200\text{V Series}$   
(up to 100A Class)

$V_{CES} = 1400\text{V Series}$   
(up to 100A Class)



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M57959L  
Hybrid IC for IGBT Gate Driver

**Absolute Maximum Ratings,  $T_a \sim 20^\circ\text{C}$  to  $70^\circ\text{C}$  unless otherwise specified**

| Item                  | Symbol    | Test Conditions                  | Limit     | Units            |
|-----------------------|-----------|----------------------------------|-----------|------------------|
| Supply Voltage*       | $V_{CC}$  | DC                               | 18        | Volts            |
|                       | $V_{EE}$  | DC                               | -15       | Volts            |
| Input Voltage         | $V_I$     |                                  | -1 ~ 7    | Volts            |
| Output Voltage        | $V_O$     | Output Voltage "H"               | $V_{CC}$  | Volts            |
| Output Current        | $I_{OHP}$ | Pulse Width 2 $\mu$ s, f = 20kHz | -2        | Amperes          |
|                       | $I_{OLP}$ | Pulse Width 2 $\mu$ s, f = 20kHz | 2         | Amperes          |
| Output Current        | $I_{OH}$  | f = 20kHz, 50% Duty Cycle        | 0.2       | Amperes          |
| Isolation Voltage     | $V_{RMS}$ | Sinewave Voltage 60kHz, 1 min.   | 2500      | Volts            |
| Junction Temperature  | $T_j$     |                                  | 85        | $^\circ\text{C}$ |
| Operating Temperature | $T_{opg}$ | (Differs from H/C Condition)     | -20 ~ 60  | $^\circ\text{C}$ |
| Storage Temperature   | $T_{stg}$ |                                  | -25 ~ 100 | $^\circ\text{C}$ |
| Fault Output Current  | $I_{FO}$  |                                  | 20        | mA               |
| Input Voltage         | $V_{R1}$  |                                  | 50        | Volts            |

\*20 Volts  $\leq V_{CC} + V_{EE} \leq 28$  Volts

**Electrical Characteristics,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 15\text{V}$ ,  $-V_{EE} = 10\text{V}$  unless otherwise specified**

| Characteristics               | Symbol      | Test conditions                             | Min. | Typ. | Max. | Unit          |
|-------------------------------|-------------|---|------|------|------|---------------|
| Supply Voltage                | $V_{CC}$    | Recommended Range                           | 14   | 15   | —    | Volts         |
|                               | $V_{EE}$    | Recommended Range                           | -7   | —    | -10  | Volts         |
| Pull-up Voltage on Input Side | $V_{IN}$    | Recommended Range                           | 4.75 | 5.00 | 5.25 | Volts         |
| "H" Input Current             | $I_{IH}$    | $V_{IN} = 5\text{V}$ , R = 185 $\Omega$     | —    | 16   | —    | mA            |
| "H" Output Voltage            | $V_{OH}$    |   | 13   | 14   | —    | Volts         |
| "L" Output Voltage            | $V_{OL}$    |   | -8   | -9   | —    | Volts         |
| Internal Power Dissipation    | $P_D$       | f = 20kHz,                                  | —    | 0.86 | —    | Watts         |
|                               |             | Module 200A, 600V IGBT                      |      |      |      |               |
| "L-H" Propagation Time        | $t_{PLH}$   | $V_I = 0$ to 4V, $T_j \pm 85^\circ\text{C}$ | —    | 0.8  | 1.5  | $\mu\text{s}$ |
| "L-H" Rise Time               | $t_r$       | $V_I = 0$ to 4V, $T_j \pm 85^\circ\text{C}$ | —    | 0.5  | 1.0  | $\mu\text{s}$ |
| "H-L" Propagation Time        | $t_{PHL}$   | $V_I = 0$ to 4V, $T_j \pm 85^\circ\text{C}$ | —    | 1.0  | 1.5  | $\mu\text{s}$ |
| "H-L" Rise Time               | $t_r$       | $V_I = 0$ to 4V, $T_j \pm 85^\circ\text{C}$ | —    | 0.3  | 0.6  | $\mu\text{s}$ |
| Reset Time of Protection      | $t_{RESET}$ |   | 1    | —    | 2    | ms            |
| Fault Output Current          | $I_{FO}$    |   | —    | 5    | —    | mA            |
| SC Voltage                    | $V_{SC}$    |   | 15   | —    | —    | Volts         |