Hybrid Integrated Circuit For Driving IGBT Modules

Description:
M57962L 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 $30kV/\mu s$, Min. $15kV/\mu s$)
- 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:

$V_{CES} = 600V$ Series
(up to 400A Class)

$V_{CES} = 1200V$ Series
(up to 200A Class)

$V_{CES} = 1400V$ Series
(up to 200A Class)
### Absolute Maximum Ratings, $T_A = 20^\circ$C to $70^\circ$C unless otherwise specified

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Limit</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage*</td>
<td>$V_{CC}$</td>
<td>DC</td>
<td>18</td>
<td>Volts</td>
</tr>
<tr>
<td></td>
<td>$V_{EE}$</td>
<td>DC</td>
<td>-15</td>
<td>Volts</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>$V_I$</td>
<td></td>
<td>-1 ~ 7</td>
<td>Volts</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>$V_O$</td>
<td>Output Voltage &quot;H&quot;</td>
<td>$V_{CC}$</td>
<td>Volts</td>
</tr>
<tr>
<td>Output Current</td>
<td>$I_{OHP}$</td>
<td>Pulse Width 2µs, $f = 20$kHz</td>
<td>-5</td>
<td>Amperes</td>
</tr>
<tr>
<td></td>
<td>$I_{OLP}$</td>
<td>Pulse Width 2µs, $f = 20$kHz</td>
<td>5</td>
<td>Amperes</td>
</tr>
<tr>
<td>Isolation Voltage</td>
<td>$V_{RMS}$</td>
<td>Sinewave Voltage 60kHz, 1 min.</td>
<td>2500</td>
<td>Volts</td>
</tr>
<tr>
<td>Junction Temperature</td>
<td>$T_j$</td>
<td></td>
<td>85</td>
<td>°C</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>$T_{opg}$</td>
<td>(Differ from H/C Condition)</td>
<td>-20 ~ 60</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{slg}$</td>
<td></td>
<td>-25 ~ 100</td>
<td>°C</td>
</tr>
<tr>
<td>Fault Output Current</td>
<td>$I_{FO}$</td>
<td></td>
<td>20</td>
<td>mA</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>$V_{R1}$</td>
<td></td>
<td>50</td>
<td>Volts</td>
</tr>
</tbody>
</table>

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

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

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply Voltage</td>
<td>$V_{CC}$</td>
<td>Recommended Range</td>
<td>14</td>
<td>15</td>
<td></td>
<td>Volts</td>
</tr>
<tr>
<td></td>
<td>$V_{EE}$</td>
<td>Recommended Range</td>
<td>-7</td>
<td></td>
<td>-10</td>
<td>Volts</td>
</tr>
<tr>
<td>Pull-up Voltage on Input Side</td>
<td>$V_{IN}$</td>
<td>Recommended Range</td>
<td>4.75</td>
<td>5.00</td>
<td>5.25</td>
<td>Volts</td>
</tr>
<tr>
<td>&quot;H&quot; Input Current</td>
<td>$I_{IH}$</td>
<td>$V_{IN} = 5$V, $R = 185$Ω</td>
<td>—</td>
<td>16</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>&quot;H&quot; Output Voltage</td>
<td>$V_{OH}$</td>
<td></td>
<td>13</td>
<td>14</td>
<td></td>
<td>Volts</td>
</tr>
<tr>
<td>&quot;L&quot; Output Voltage</td>
<td>$V_{OL}$</td>
<td></td>
<td>-8</td>
<td>-9</td>
<td></td>
<td>Volts</td>
</tr>
<tr>
<td>Internal Power Dissipation</td>
<td>$P_D$</td>
<td>$f = 20$kHz, Module 400A, 1200V IGBT</td>
<td>—</td>
<td>2.38</td>
<td></td>
<td>Watts</td>
</tr>
<tr>
<td>&quot;L-H&quot; Propagation Time</td>
<td>$t_{PLH}$</td>
<td>$V_I = 0$ to 4V, $T_j \pm 85^\circ$C</td>
<td>—</td>
<td>1.0</td>
<td>1.5</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;L-H&quot; Rise Time</td>
<td>$t_r$</td>
<td>$V_I = 0$ to 4V, $T_j \pm 85^\circ$C</td>
<td>—</td>
<td>0.6</td>
<td>1.0</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;H-L&quot; Propagation Time</td>
<td>$t_{PHL}$</td>
<td>$V_I = 0$ to 4V, $T_j \pm 85^\circ$C</td>
<td>—</td>
<td>1.0</td>
<td>1.5</td>
<td>µs</td>
</tr>
<tr>
<td>&quot;H-L&quot; Rise Time</td>
<td>$t_r$</td>
<td>$V_I = 0$ to 4V, $T_j \pm 85^\circ$C</td>
<td>—</td>
<td>0.4</td>
<td>1.0</td>
<td>µs</td>
</tr>
<tr>
<td>Reset Time of Protection</td>
<td>$t_{RESET}$</td>
<td></td>
<td>1</td>
<td></td>
<td>2</td>
<td>ms</td>
</tr>
<tr>
<td>Fault Output Current</td>
<td>$I_{FO}$</td>
<td></td>
<td>—</td>
<td>5</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>SC Voltage</td>
<td>$V_{SC}$</td>
<td></td>
<td>15</td>
<td></td>
<td></td>
<td>Volts</td>
</tr>
</tbody>
</table>