

**FH30150B**
**N-Channel Trench Power MOSFET**
**Description**

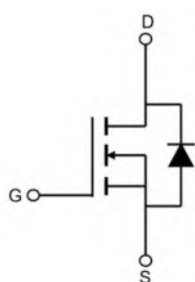
The FH30150B uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

**Applications**

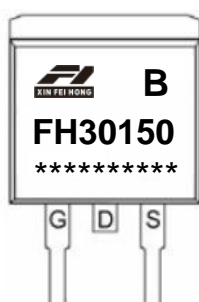
- ◆ Load Switch
- ◆ PWM Application
- ◆ Power management

**General Features**

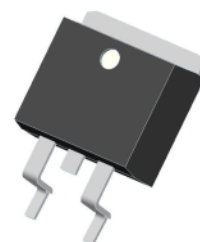
- ◆  $V_{DSS}=30V$  ,  $I_D=150A$
- ◆  $R_{DS(ON)}=1.8m\Omega$  (typ) @  $V_{GS}=10V$
- ◆  $R_{DS(ON)}=2.4m\Omega$  (typ) @  $V_{GS}=4.5V$
- ◆ Advanced Trench Technology
- ◆ Excellent  $R_{DS(ON)}$  and Low Gate Charge
- ◆ Lead free product is acquired



Schematic diagram

**TO-263**


Marking and pin assignment



TO-263 top view

**Absolute Maximum Ratings** ( $T_C=25^\circ C$  unless otherwise specified)

| Symbol          | Parameter                                       | Max.                | Units        |
|-----------------|---|---------------------|--------------|
| $V_{DSS}$       | Drain-Source Voltage                            | 30                  | V            |
| $V_{GSS}$       | Gate-Source Voltage                             | $\pm 20$            | V            |
| $I_D$           | Continuous Drain Current                        | $T_C = 25^\circ C$  | 150          |
|                 |   | $T_C = 100^\circ C$ | 98           |
| $I_{DM}$        | Pulsed Drain Current <sup>note1</sup>           | 600                 | A            |
| $E_{AS}$        | Single Pulsed Avalanche Energy <sup>note2</sup> | 225                 | mJ           |
| $P_D$           | Power Dissipation                               | $T_C = 25^\circ C$  | 172          |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case            | 0.87                | $^\circ C/W$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range         | -55 to +175         | $^\circ C$   |

**Electrical Characteristics** ( $T_C=25^\circ\text{C}$  unless otherwise specified)

| Symbol  | Parameter   | Test Condition   | Min. | Typ. | Max.      | Units      |
|---|---|--|------|------|-----------|------------|
| <b>Off Characteristic</b>                                     |   |  |      |      |           |            |
| $V_{(BR)DSS}$   | Drain-Source Breakdown Voltage                            | $V_{GS}=0V, I_D=250\mu A$                                    | 30   | -    | -         | V          |
| $I_{DSS}$   | Zero Gate Voltage Drain Current                           | $V_{DS}=30V, V_{GS}=0V,$                                     | -    | -    | 1.0       | $\mu A$    |
| $I_{GSS}$   | Gate to Body Leakage Current                              | $V_{DS}=0V, V_{GS}=\pm 20V$                                  | -    | -    | $\pm 100$ | nA         |
| <b>On Characteristics</b>                                     |   |  |      |      |           |            |
| $V_{GS(th)}$  | Gate Threshold Voltage                                    | $V_{DS}=V_{GS}, I_D=250\mu A$                                | 1.0  | 1.6  | 2.5       | V          |
| $R_{DS(on)}$  | Static Drain-Source on-Resistance<br><small>note3</small> | $V_{GS}=10V, I_D=30A$  | -    | 1.8  | 2.6       | m $\Omega$ |
|   |   | $V_{GS}=4.5V, I_D=20A$                                       | -    | 2.4  | 3.4       |            |
| <b>Dynamic Characteristics</b>                                |   |  |      |      |           |            |
| $C_{iss}$   | Input Capacitance   | $V_{DS}=15V, V_{GS}=0V,$<br>$f=1.0MHz$                       | -    | 6847 | -         | pF         |
| $C_{oss}$   | Output Capacitance  |  | -    | 940  | -         | pF         |
| $C_{rss}$   | Reverse Transfer Capacitance                              |  | -    | 604  | -         | pF         |
| $Q_g$   | Total Gate Charge   | $V_{DS}=15V, I_D=30A,$<br>$V_{GS}=10V$                       | -    | 93   | -         | nC         |
| $Q_{gs}$  | Gate-Source Charge  |  | -    | 14   | -         | nC         |
| $Q_{gd}$  | Gate-Drain("Miller") Charge                               |  | -    | 21   | -         | nC         |
| <b>Switching Characteristics</b>                              |   |  |      |      |           |            |
| $t_{d(on)}$   | Turn-on Delay Time  | $V_{DS}=15V,$<br>$I_D=30A, R_{GEN}=3\Omega,$<br>$V_{GS}=10V$ | -    | 16   | -         | ns         |
| $t_r$   | Turn-on Rise Time   |  | -    | 9    | -         | ns         |
| $t_{d(off)}$  | Turn-off Delay Time                                       |  | -    | 65   | -         | ns         |
| $t_f$   | Turn-off Fall Time  |  | -    | 18   | -         | ns         |
| <b>Drain-Source Diode Characteristics and Maximum Ratings</b> |   |  |      |      |           |            |
| $I_S$   | Maximum Continuous Drain to Source Diode Forward Current  |  | -    | -    | 150       | A          |
| $I_{SM}$  | Maximum Pulsed Drain to Source Diode Forward Current      |  | -    | -    | 600       | A          |
| $V_{SD}$  | Drain to Source Diode Forward Voltage                     | $V_{GS}=0V, I_S=30A$   | -    | -    | 1.2       | V          |
| $t_{rr}$  | Body Diode Reverse Recovery Time                          | $I_F=20A, di/dt=100A/\mu s$                                  | -    | 29   | -         | ns         |
| $Q_{rr}$  | Body Diode Reverse Recovery Charge                        |  | -    | 19   | -         | nC         |

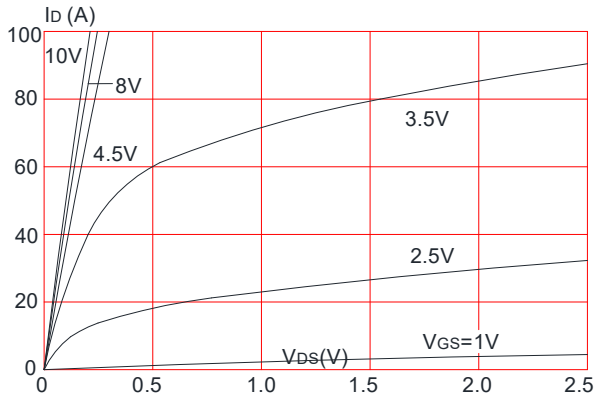
Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=15V, V_G=10V, L=0.5mH, R_G=25\Omega, I_{AS}=30A$

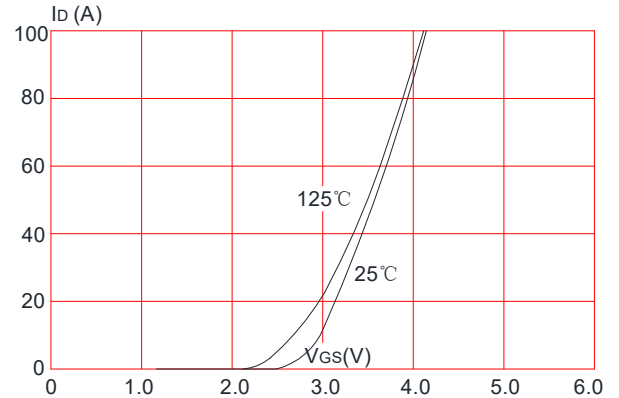
3. Pulse Test: Pulse Width $\leq 300\mu s$ , Duty Cycle $\leq 0.5\%$

## Typical Performance Characteristics

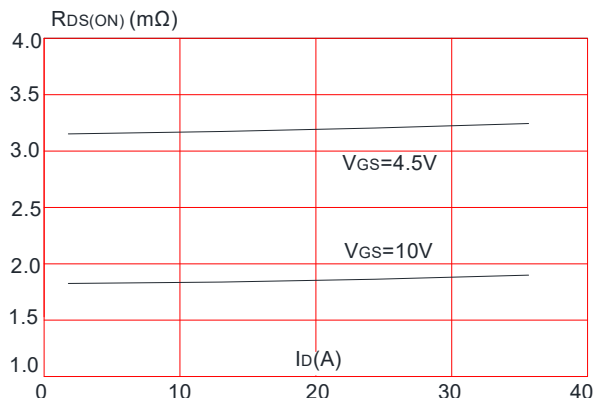
**Figure 1: Output Characteristics**



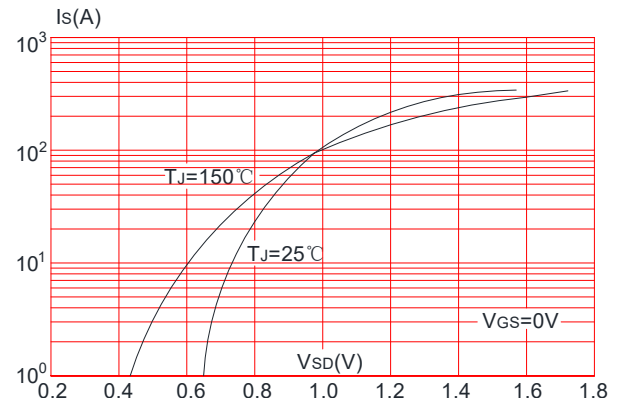
**Figure 2: Typical Transfer Characteristics**



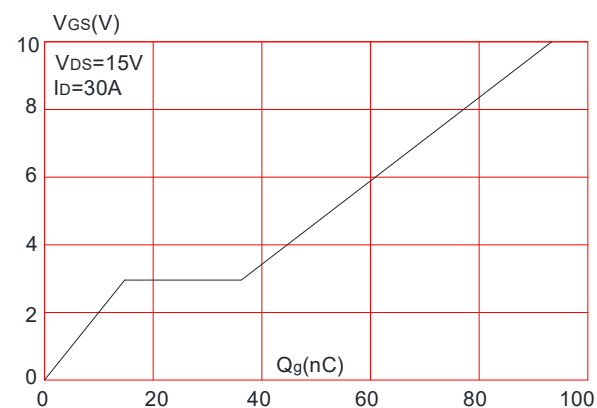
**Figure 3: On-resistance vs. Drain Current**



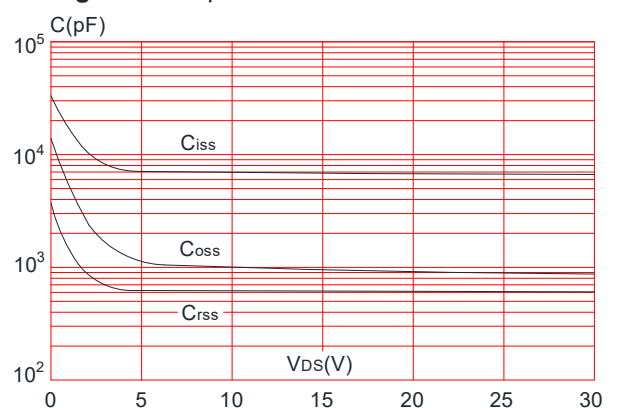
**Figure 4: Body Diode Characteristics**



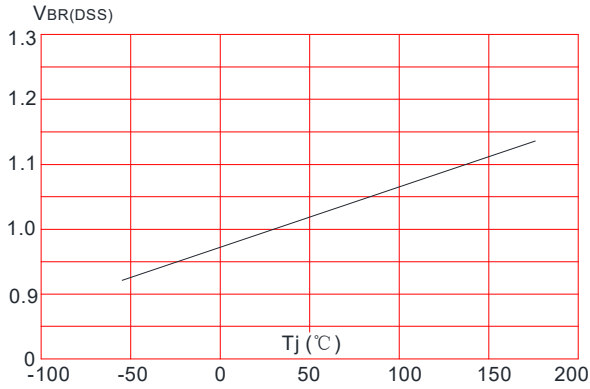
**Figure 5: Gate Charge Characteristics**



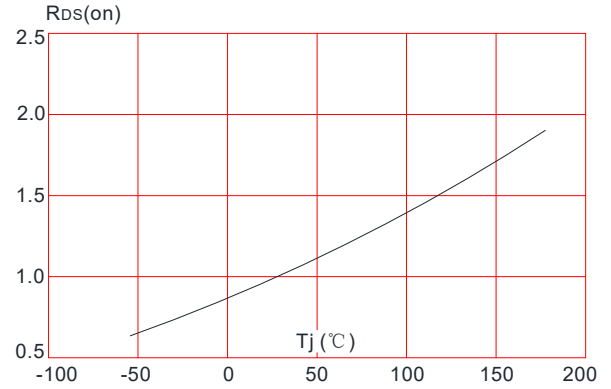
**Figure 6: Capacitance Characteristics**



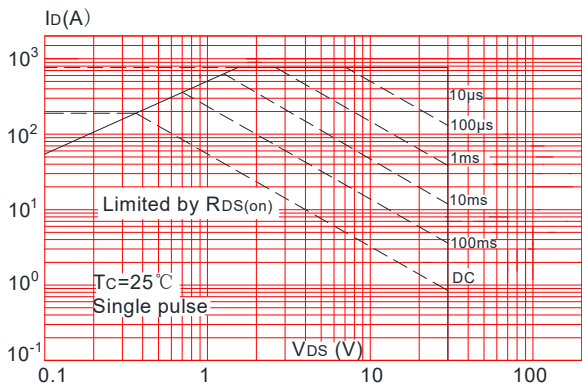
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



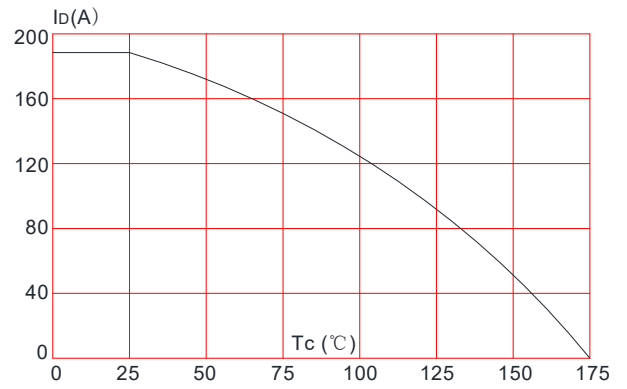
**Figure 8:** Normalized on Resistance vs. Junction Temperature



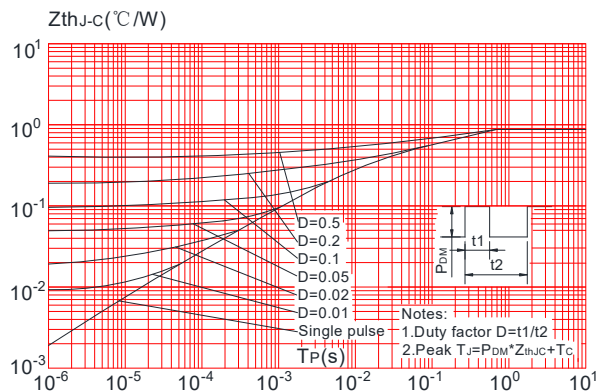
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



Test Circuit

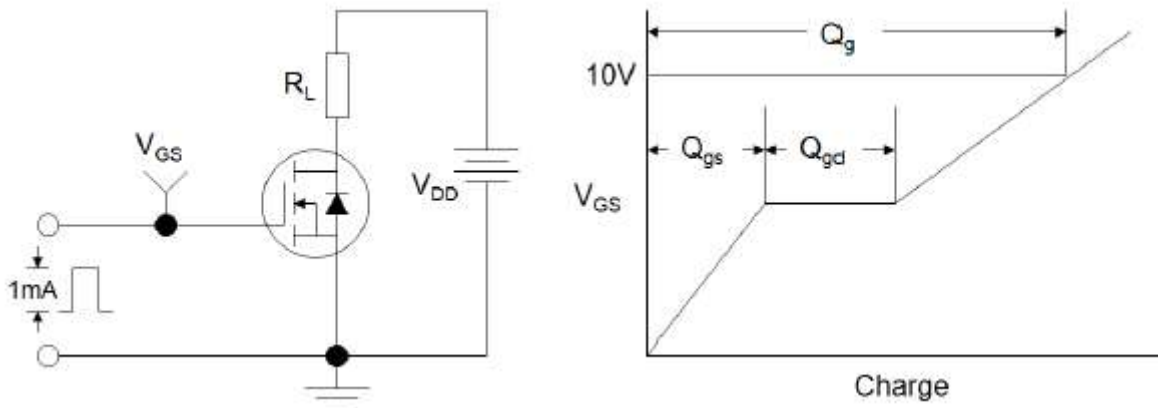


Figure1:Gate Charge Test Circuit & Waveform

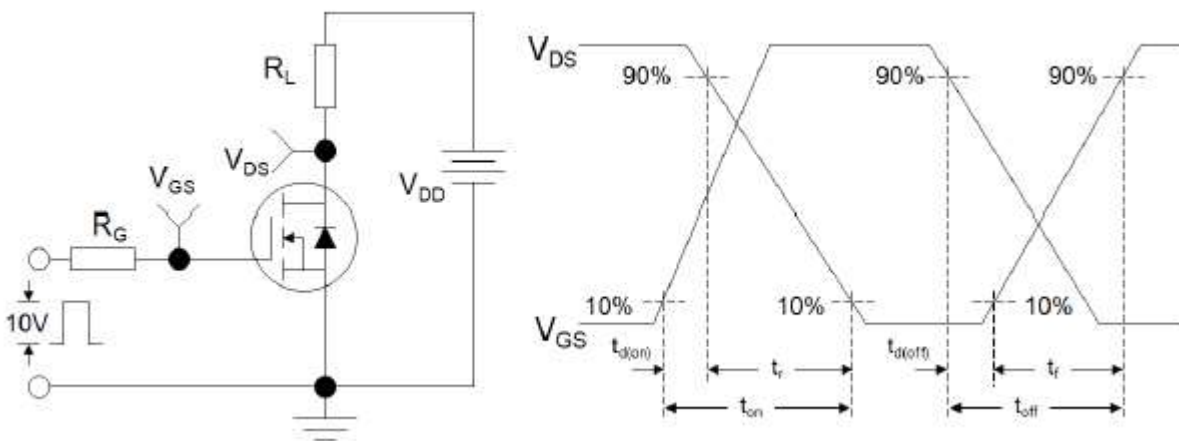


Figure 2: Resistive Switching Test Circuit & Waveforms

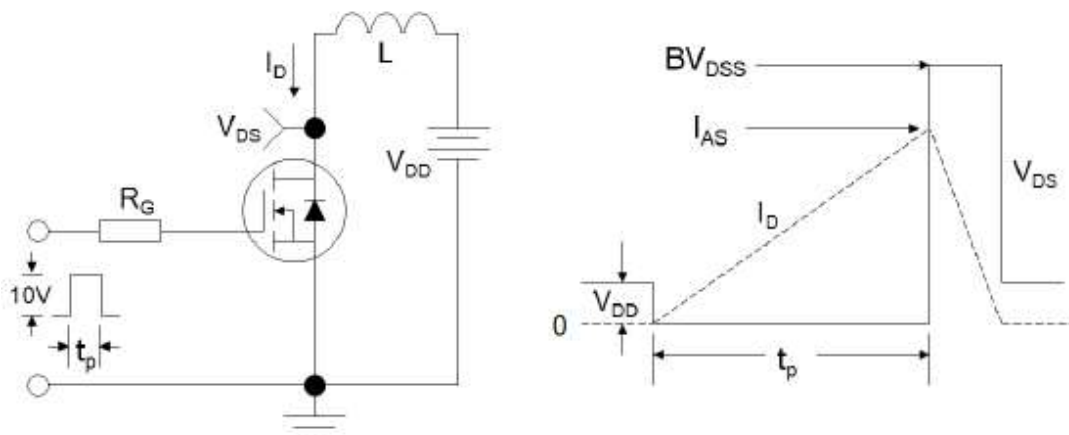
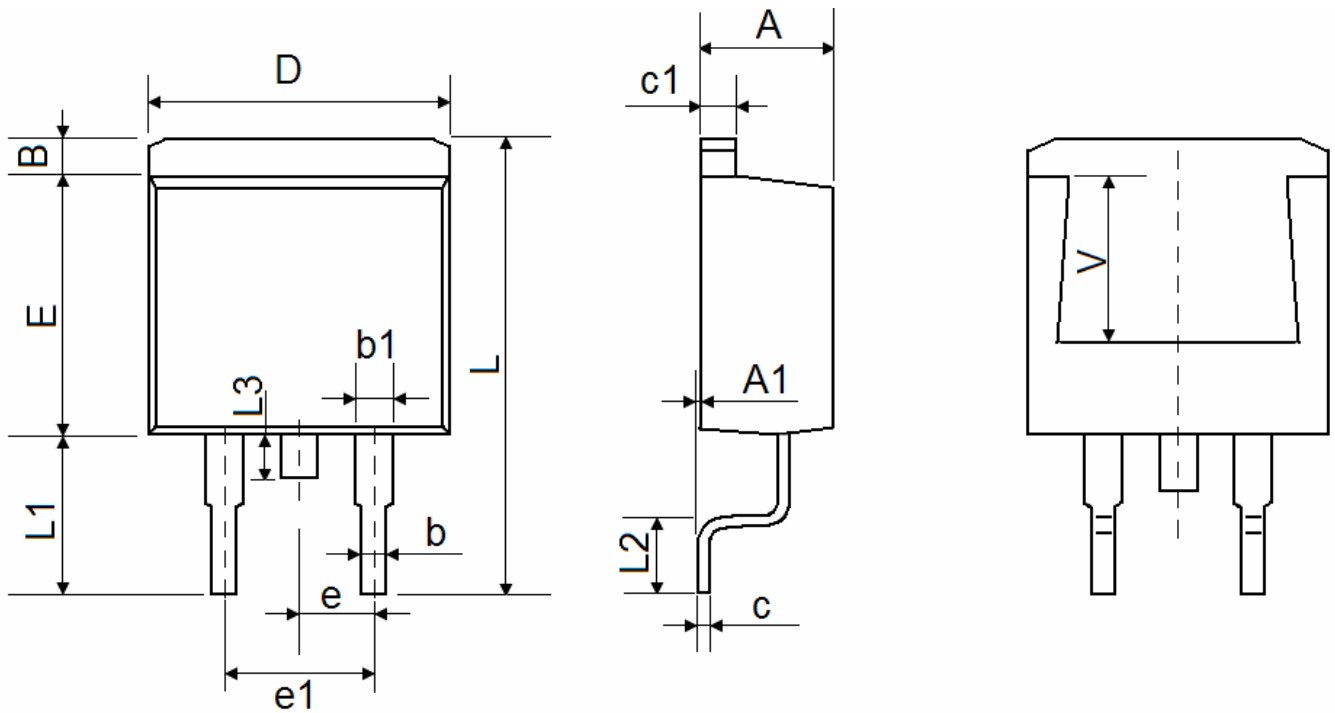


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

Package Information : TO-263



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.470                     | 4.670  | 0.176                | 0.184 |
| A1     | 0.000                     | 0.150  | 0.000                | 0.006 |
| B      | 1.170                     | 1.370  | 0.046                | 0.054 |
| b      | 0.710                     | 0.910  | 0.028                | 0.036 |
| b1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| c      | 0.310                     | 0.530  | 0.012                | 0.021 |
| c1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| D      | 10.010                    | 10.310 | 0.394                | 0.406 |
| E      | 8.500                     | 8.900  | 0.335                | 0.350 |
| e      | 2.540 TYP.                |        | 0.100 TYP.           |       |
| e1     | 4.980                     | 5.180  | 0.196                | 0.204 |
| L      | 15.050                    | 15.450 | 0.593                | 0.608 |
| L1     | 5.080                     | 5.480  | 0.200                | 0.216 |
| L2     | 2.340                     | 2.740  | 0.092                | 0.108 |
| L3     | 1.300                     | 1.700  | 0.051                | 0.067 |
| V      | 5.600 REF                 |        | 0.220 REF            |       |