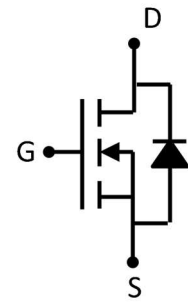


## Feature

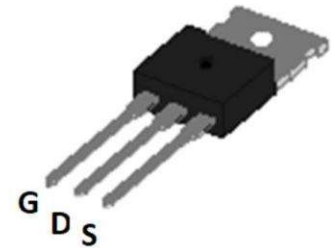
- 85V,135A  
 $R_{DS(ON)} < 5m\Omega @ V_{GS}=10V$
- Advanced Trench Power MOSFET
- Provide Excellent  $R_{DS(ON)}$  And Low Gate Charge



Schematic diagram

## Application

- DC/DC Converter
- Load Switch for Portable Devices
- Battery Switch
- Rectifier



TO-220C

## Package Marking and Ordering Information

| Device Marking | Device    | Device Package | Reel Size | Tape width | Quantity (PCS) |
|----------------|-----------|----------------|-----------|------------|----------------|
| G050N85        | APG050N85 | TO-220C        |           | -          | 1000           |

## ABSOLUTE MAXIMUM RATINGS ( $T_a=25^\circ\text{C}$ unless otherwise noted)

| Parameter  | Symbol          | Value     | Unit                      |
|--|-----------------|-----------|---------------------------|
| Drain-Source Voltage                                   | $V_{DS}$        | 85        | V                         |
| Gate-Source Voltage                                    | $V_{GS}$        | $\pm 20$  | V                         |
| Continuous Drain Current ( $T_a = 25^\circ\text{C}$ )  | $I_D$           | 135       | A                         |
| Continuous Drain Current ( $T_a = 100^\circ\text{C}$ ) | $I_D$           | 80        | A                         |
| Pulsed Drain Current <sup>(1)</sup>                    | $I_{DM}$        | 260       | A                         |
| Singel Pulsed Avalanche Energy <sup>(2)</sup>          | $E_{AS}$        | 238       | mJ                        |
| Power Dissipation                                      | $P_D$           | 196       | W                         |
| Thermal Resistance from Junction to Case               | $R_{\theta JC}$ | 0.59      | $^\circ\text{C}/\text{W}$ |
| Junction Temperature                                   | $T_J$           | 150       | $^\circ\text{C}$          |
| Storage Temperature                                    | $T_{STG}$       | -55~ +150 | $^\circ\text{C}$          |

**MOSFET ELECTRICAL CHARACTERISTICS(T<sub>a</sub>=25°C unless otherwise noted)**

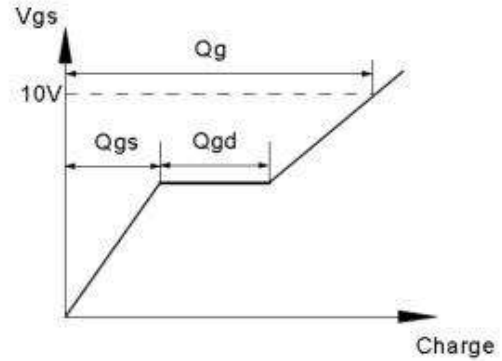
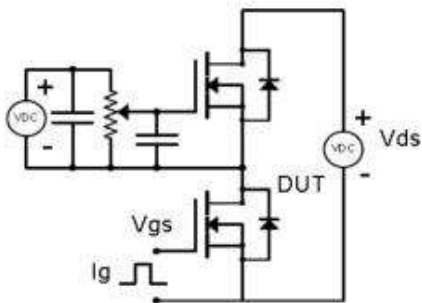
| Parameter                                 | Symbol               | Test Condition  | Min | Type | Max  | Unit |
|---|----------------------|---|-----|------|------|------|
| <b>Static Characteristics</b>             |                      |   |     |      |      |      |
| Drain-source breakdown voltage            | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> =250μA   | 85  | -    | -    | V    |
| Zero gate voltage drain current           | I <sub>DSS</sub>     | V <sub>DS</sub> =85V, V <sub>GS</sub> = 0V  | -   | -    | 1    | μA   |
| Gate-body leakage current                 | I <sub>GSS</sub>     | V <sub>GS</sub> =±20V, V <sub>DS</sub> = 0V   | -   | -    | ±100 | nA   |
| Gate threshold voltage <sup>(3)</sup>     | V <sub>GS(th)</sub>  | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 2   | 3    | 4    | V    |
| Drain-source on-resistance <sup>(3)</sup> | R <sub>DS(on)</sub>  | V <sub>GS</sub> =10V, I <sub>D</sub> =70A   | -   | 4.5  | 5    | mΩ   |
| Forward tranconductance <sup>(3)</sup>    | g <sub>FS</sub>      | V <sub>DS</sub> =10V, I <sub>D</sub> =70A   | -   | 95   | -    | S    |
| <b>Dynamic characteristics</b>            |                      |   |     |      |      |      |
| Input Capacitance                         | C <sub>iss</sub>     | V <sub>DS</sub> =40V, V <sub>GS</sub> =0V, f =1MHz                                      | -   | 2924 | -    | pF   |
| Output Capacitance                        | C <sub>oss</sub>     |   | -   | 771  | -    |      |
| Reverse Transfer Capacitance              | C <sub>rss</sub>     |   | -   | 15   | -    |      |
| <b>Switching characteristics</b>          |                      |   |     |      |      |      |
| Turn-on delay time                        | t <sub>d(on)</sub>   | V <sub>DD</sub> =40V, I <sub>D</sub> =70A,<br>V <sub>GS</sub> =10V, R <sub>G</sub> =25Ω | -   | 19   | -    | ns   |
| Turn-on rise time                         | t <sub>r</sub>       |   | -   | 33   | -    |      |
| Turn-off delay time                       | t <sub>d(off)</sub>  |   | -   | 29   | -    |      |
| Turn-off fall time                        | t <sub>f</sub>       |   | -   | 19   | -    |      |
| Total Gate Charge                         | Q <sub>g</sub>       | V <sub>DS</sub> =40V, I <sub>D</sub> =70A,<br>V <sub>GS</sub> =10V                      | -   | 48   | -    | nC   |
| Gate-Source Charge                        | Q <sub>gs</sub>      |   | -   | 13   | -    |      |
| Gate-Drain Charge                         | Q <sub>gd</sub>      |   | -   | 19   | -    |      |
| <b>Source-Drain Diode characteristics</b> |                      |   |     |      |      |      |
| Diode Forward voltage <sup>(3)</sup>      | V <sub>DS</sub>      | V <sub>GS</sub> =0V, I <sub>S</sub> =120A   | -   | -    | 1.2  | V    |
| Diode Forward current <sup>(4)</sup>      | I <sub>S</sub>       |   | -   | -    | 135  | A    |
| Reverse recovery time                     | T <sub>rr</sub>      | I <sub>S</sub> =60A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us                   |     | 52   |      | ns   |
| Reverse recovery charge                   | Q <sub>rr</sub>      | I <sub>S</sub> =60A, V <sub>GS</sub> =0V, dI <sub>F</sub> /dt=100A/us                   |     | 73   |      | nC   |

**Notes:**

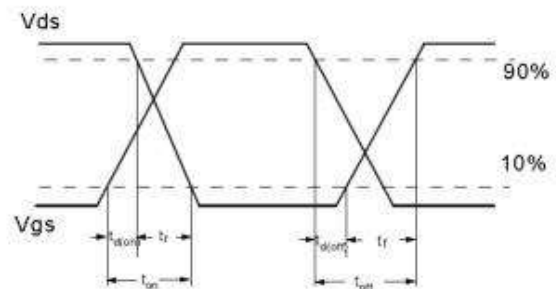
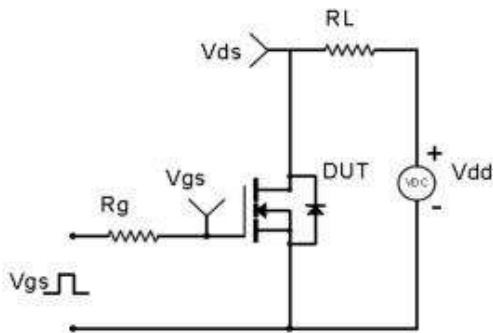
1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition: T<sub>J</sub>=25°C, V<sub>DD</sub>=10V, R<sub>G</sub>=20 Ω, L=0.5mH, I<sub>AS</sub>=30A
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board, t≤10 sec

**Test Circuit & Waveform**

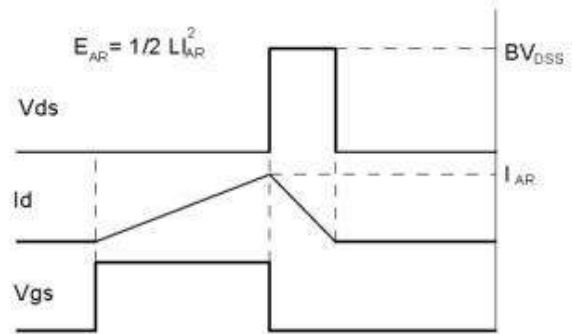
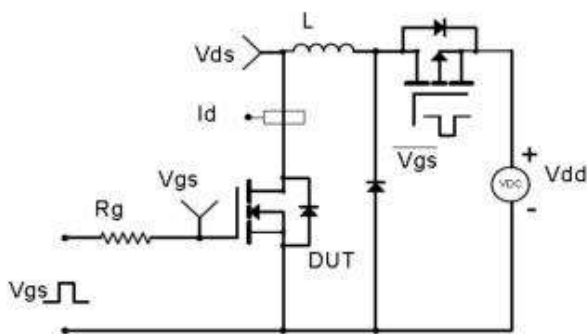
Gate Charge Test Circuit & Waveform



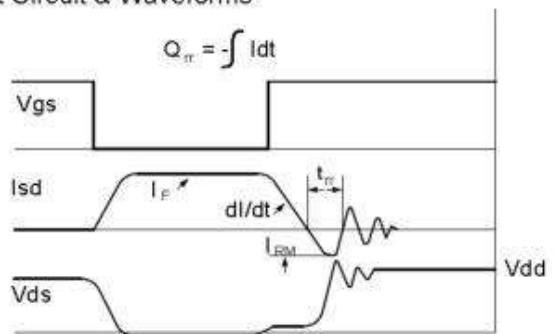
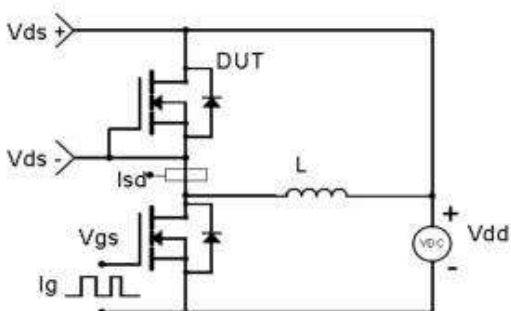
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



**Typical Electronic and Thermal Characteristics**

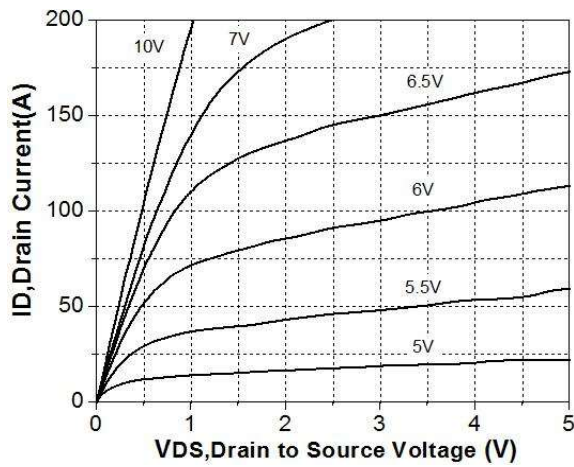


Figure 1. On-Region Characteristics

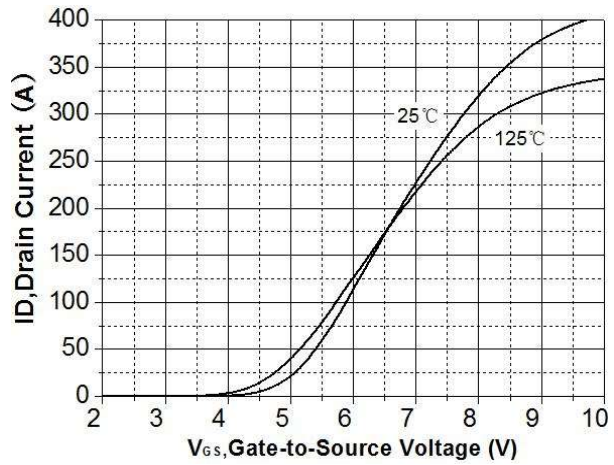


Figure 2. Transfer Characteristics

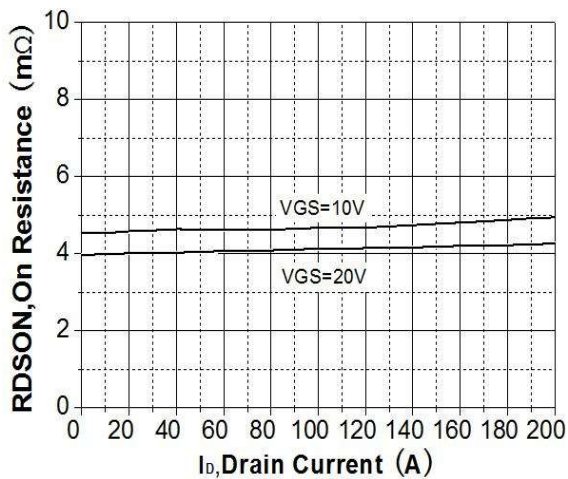


Figure 3. On-Resistance Variation vs Drain Current

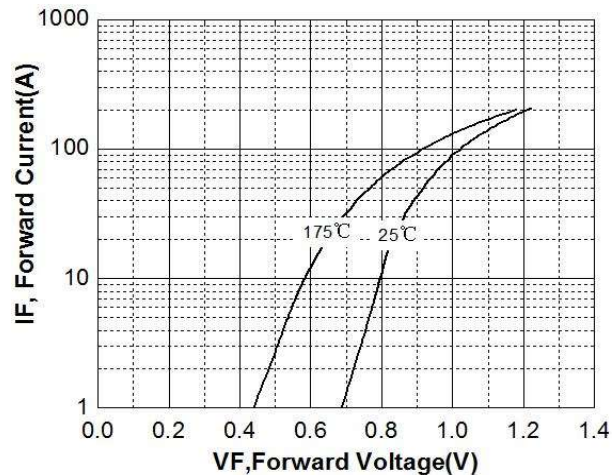


Figure 4. Body Diode Forward Voltage Vs Reverse Drain Current

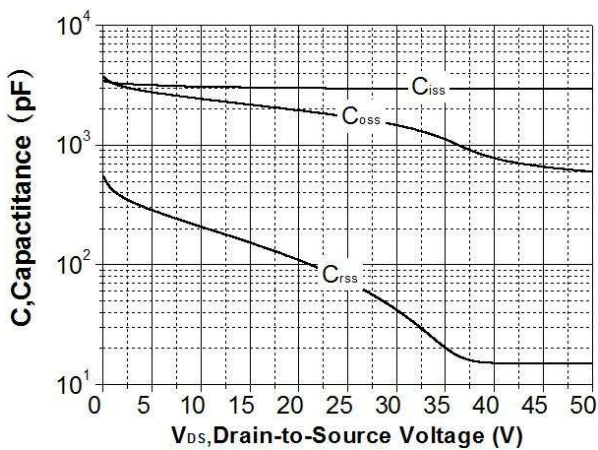


Figure 5. Capacitance Characteristics

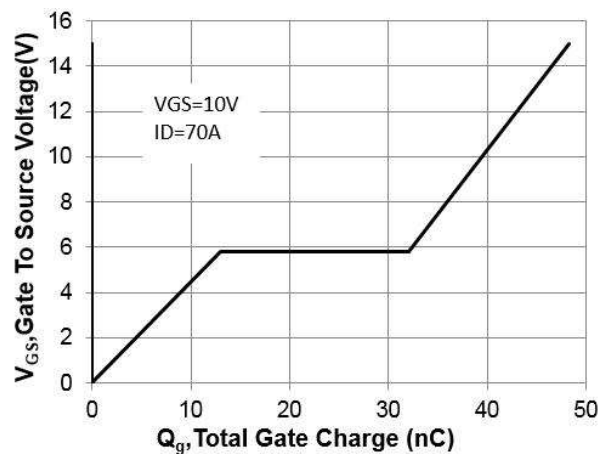


Figure 6. Gate Charge Characteristics

Typical Electronic and Thermal Characteristics

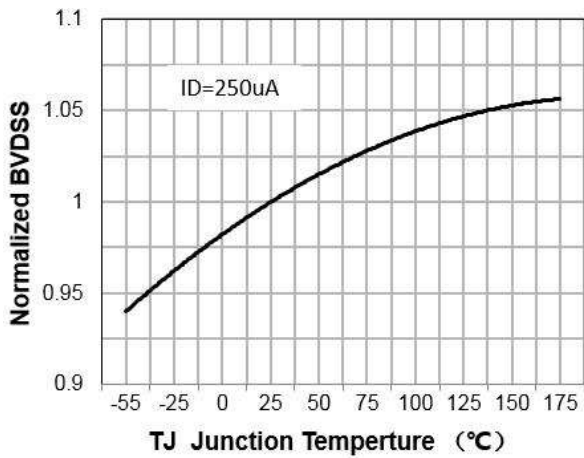


Figure 7. Breakdown Voltage Variation vs Temperature

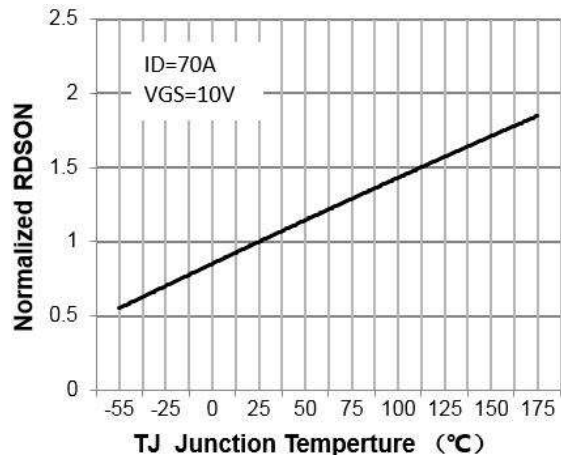


Figure 8. On-Resistance Variation vs Temperature

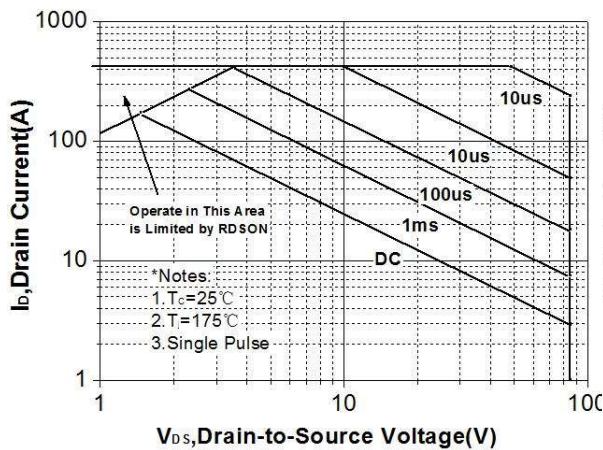


Figure 9. Maximum Safe Operating Area

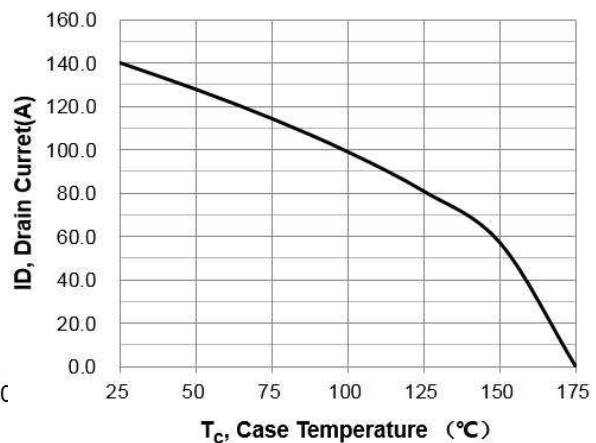


Figure 10. Maximum Drain Current vs Case Temperature

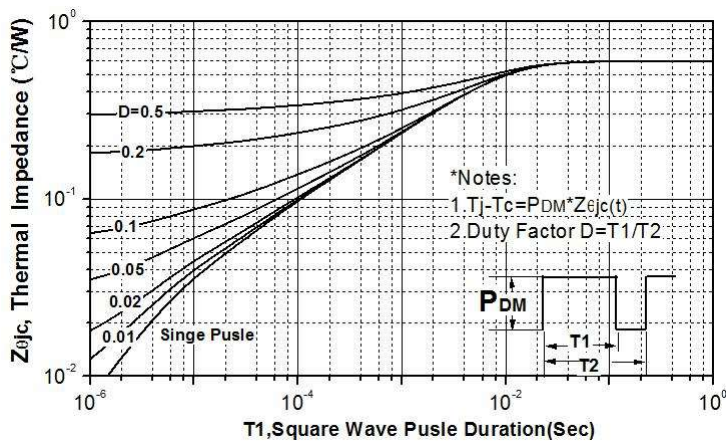
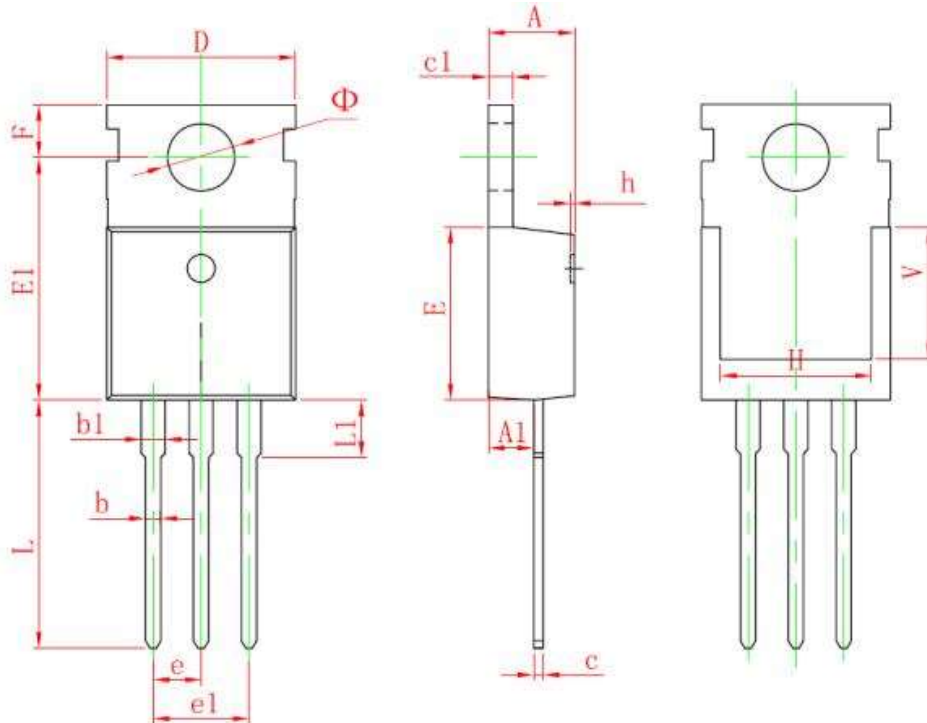


Figure 11. Transient Thermal Response Curve

# APG050N85

N-Channel Shielding-Gate Mosfet

### TO220C Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 4.400                     | 4.600  | 0.173                | 0.181 |
| A1     | 2.250                     | 2.550  | 0.089                | 0.100 |
| b      | 0.710                     | 0.910  | 0.028                | 0.036 |
| b1     | 1.170                     | 1.370  | 0.046                | 0.054 |
| c      | 0.330                     | 0.650  | 0.013                | 0.026 |
| c1     | 1.200                     | 1.400  | 0.047                | 0.055 |
| D      | 9.910                     | 10.250 | 0.390                | 0.404 |
| E      | 8.950                     | 9.750  | 0.352                | 0.384 |
| E1     | 12.650                    | 13.050 | 0.498                | 0.514 |
| e      | 2.540 TYP.                |        | 0.100 TYP.           |       |
| e1     | 4.980                     | 5.180  | 0.196                | 0.204 |
| F      | 2.650                     | 2.950  | 0.104                | 0.116 |
| H      | 7.900                     | 8.100  | 0.311                | 0.319 |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| L      | 12.900                    | 13.400 | 0.508                | 0.528 |
| L1     | 2.850                     | 3.250  | 0.112                | 0.128 |
| V      | 6.900 REF.                |        | 0.276 REF.           |       |
| Φ      | 3.400                     | 3.800  | 0.134                | 0.150 |