

## Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$

## Applications

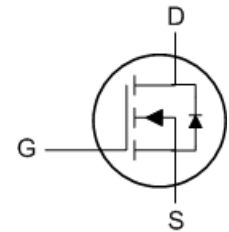
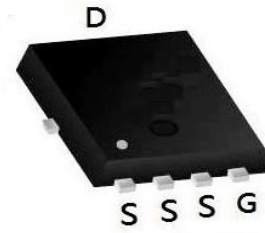
- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

## Product Summary



| BVDSS | RDSON | ID   |
|-------|-------|------|
| 85V   | 4.3mΩ | 100A |

## PDFN5060-8L Pin Configuration



## 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                         | $T_C = 25^\circ\text{C}$  | $I_D$          | 100        | A                |
|                                                  | $T_C = 100^\circ\text{C}$ |                | 63.3       |                  |
| Pulsed Drain Current <sup>1</sup>                |                           | $I_{DM}$       | 400        | A                |
| Single Pulse Avalanche Energy <sup>2</sup>       |                           | $E_{AS}$       | 273.8      | mJ               |
| Total Power Dissipation                          | $T_C = 25^\circ\text{C}$  | $P_D$          | 107.8      | W                |
| Operating Junction and Storage Temperature Range |                           | $T_J, T_{STG}$ | -55 to 150 | $^\circ\text{C}$ |

## Thermal Characteristics

| Parameter                                                | Symbol          | Value | Unit               |
|----------------------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance from Junction-to-Ambient <sup>3</sup> | $R_{\theta JA}$ | 60    | $^\circ\text{C/W}$ |
| Thermal Resistance from Junction-to-Case                 | $R_{\theta JC}$ | 1.16  | $^\circ\text{C/W}$ |

### Electrical Characteristics (T<sub>J</sub> = 25°C, unless otherwise noted)

| Parameter                               |                       | Symbol               | Test Conditions                                                                        | Min. | Typ. | Max. | Unit |
|-----------------------------------------|-----------------------|----------------------|----------------------------------------------------------------------------------------|------|------|------|------|
| Static Characteristics                  |                       |                      |                                                                                        |      |      |      |      |
| Drain-Source Breakdown Voltage          |                       | V <sub>(BR)DSS</sub> | V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA                                           | 85   | -    | -    | V    |
| Gate-body Leakage current               |                       | I <sub>GSS</sub>     | V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±20V                                           | -    | -    | ±100 | nA   |
| Zero Gate Voltage Drain Current         | T <sub>J</sub> =25°C  | I <sub>DSS</sub>     | V <sub>DS</sub> = 85V, V <sub>GS</sub> = 0V                                            | -    | -    | 1    | μA   |
|                                         | T <sub>J</sub> =100°C |                      |                                                                                        | -    | -    | 100  |      |
| Gate-Threshold Voltage                  |                       | 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>4</sup> |                       | R <sub>DS(on)</sub>  | V <sub>GS</sub> = 10V, I <sub>D</sub> = 20A                                            | -    | 4.3  | 5.6  | mΩ   |
| Forward Transconductance <sup>4</sup>   |                       | g <sub>fs</sub>      | V <sub>DS</sub> = 5V, I <sub>D</sub> =20A                                              | -    | 57.8 | -    | S    |
| Dynamic Characteristics <sup>5</sup>    |                       |                      |                                                                                        |      |      |      |      |
| Input Capacitance                       |                       | C <sub>iss</sub>     | V <sub>DS</sub> = 40V, V <sub>GS</sub> =0V, f =1MHz                                    | -    | 4645 | -    | pF   |
| Output Capacitance                      |                       | C <sub>oss</sub>     |                                                                                        | -    | 673  | -    |      |
| Reverse Transfer Capacitance            |                       | C <sub>rss</sub>     |                                                                                        | -    | 41   | -    |      |
| Gate Resistance                         |                       | R <sub>g</sub>       | f=1MHz                                                                                 | -    | 2.0  | -    | Ω    |
| Switching Characteristics <sup>5</sup>  |                       |                      |                                                                                        |      |      |      |      |
| Total Gate Charge                       |                       | Q <sub>g</sub>       | V <sub>GS</sub> = 10V, V <sub>DS</sub> = 40V, I <sub>D</sub> = 20A                     | -    | 61.3 | -    | nC   |
| Gate-Source Charge                      |                       | Q <sub>gs</sub>      |                                                                                        | -    | 21   | -    |      |
| Gate-Drain Charge                       |                       | Q <sub>gd</sub>      |                                                                                        | -    | 11   | -    |      |
| Turn-on Delay Time                      |                       | t <sub>d(on)</sub>   | V <sub>GS</sub> =10V, V <sub>DD</sub> = 40V, R <sub>G</sub> = 3Ω, I <sub>D</sub> = 20A | -    | 16.5 | -    | ns   |
| Rise Time                               |                       | t <sub>r</sub>       |                                                                                        | -    | 51.8 | -    |      |
| Turn-off Delay Time                     |                       | t <sub>d(off)</sub>  |                                                                                        | -    | 37.1 | -    |      |
| Fall Time                               |                       | t <sub>f</sub>       |                                                                                        | -    | 8.2  | -    |      |
| Body Diode Reverse Recovery Time        |                       | t <sub>rr</sub>      | I <sub>F</sub> =20A, di/dt = 100A/μS                                                   | -    | 69   | -    | ns   |
| Body Diode Reverse Recovery Charge      |                       | Q <sub>rr</sub>      |                                                                                        | -    | 141  | -    | nC   |
| Drain-Source Body Diode Characteristics |                       |                      |                                                                                        |      |      |      |      |
| Diode Forward Voltage <sup>4</sup>      |                       | V <sub>SD</sub>      | I <sub>S</sub> = 20A, V <sub>GS</sub> = 0V                                             | -    | -    | 1.2  | V    |
| Continuous Source Current               | T <sub>C</sub> =25°C  | I <sub>S</sub>       | -                                                                                      | -    | -    | 100  | A    |

Notes:

1. Repetitive rating, pulse width limited by junction temperature T<sub>J</sub>(MAX)=150°C
2. The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=50V, V<sub>GS</sub>=10V, L=0.4mH, I<sub>AS</sub>=37A
3. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

## Typical Characteristics

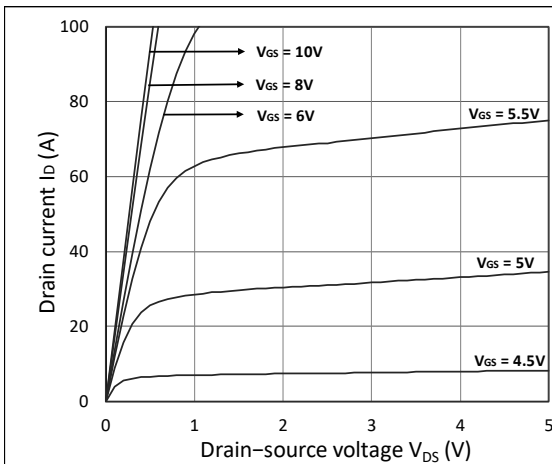


Figure 1. Output Characteristics

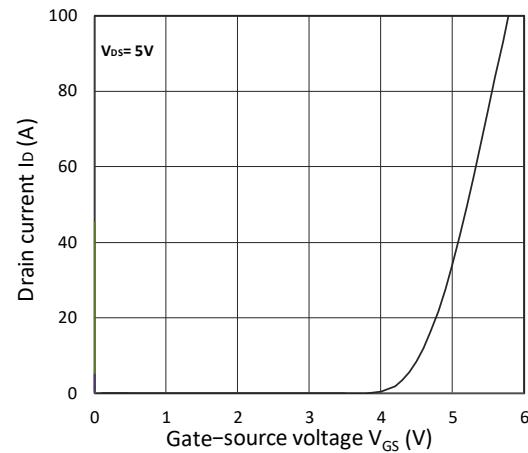


Figure 2. Transfer Characteristics

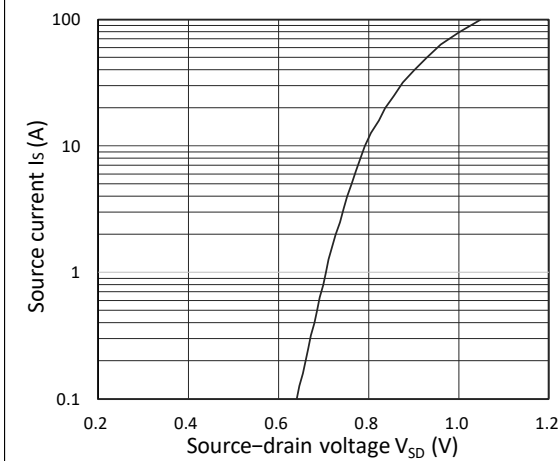


Figure 3. Forward Characteristics of Reverse

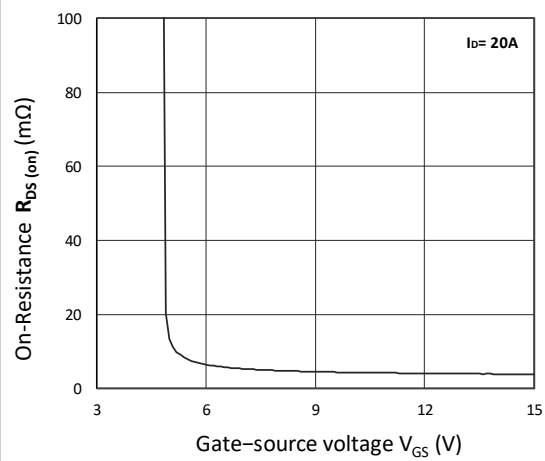


Figure 4.  $R_{DS(on)}$  vs.  $V_{GS}$

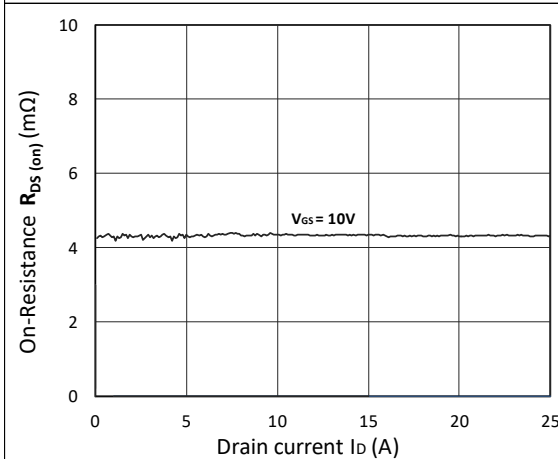


Figure 5.  $R_{DS(on)}$  vs.  $I_D$

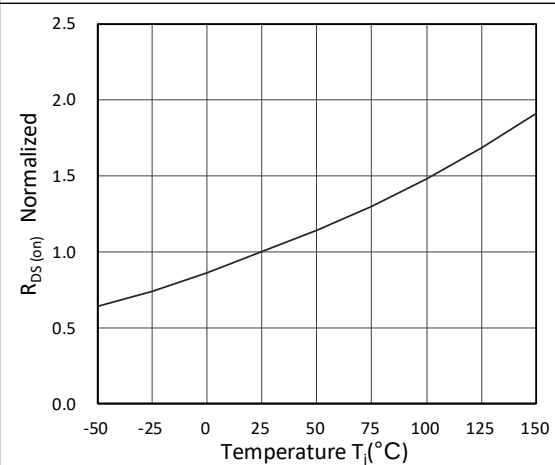


Figure 6. Normalized  $R_{DS(on)}$  vs. Temperature

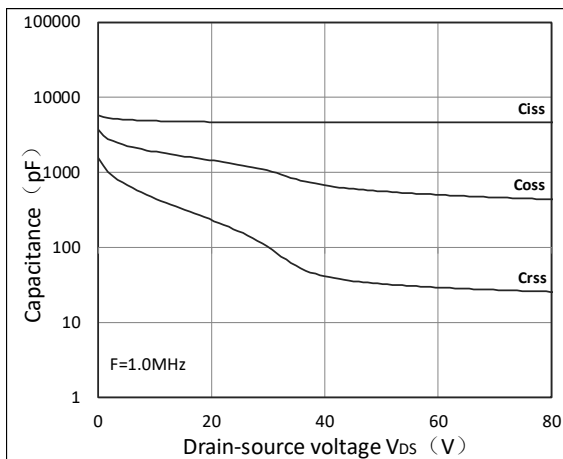


Figure 7. Capacitance Characteristics

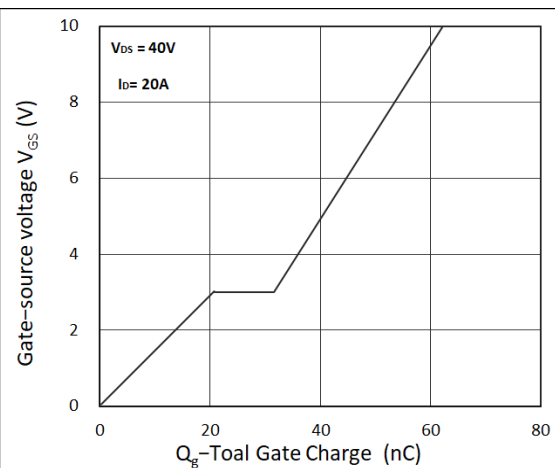


Figure 8. Gate Charge Characteristics

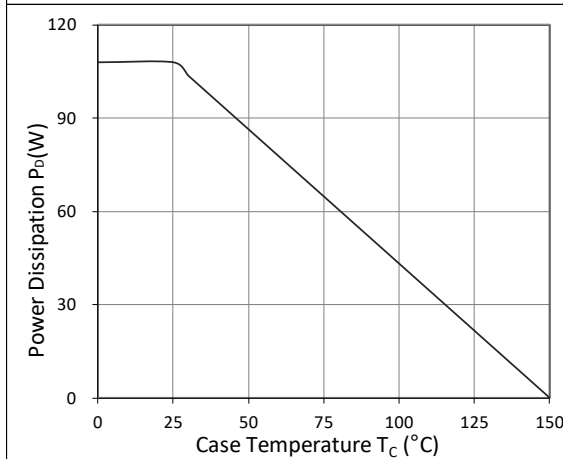


Figure 9. Power Dissipation

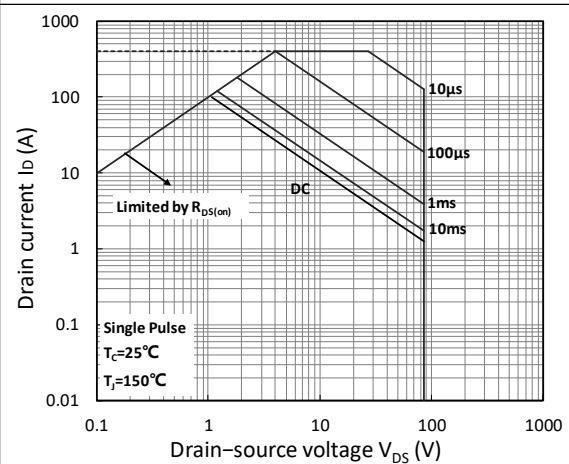


Figure10. Safe Operating Area

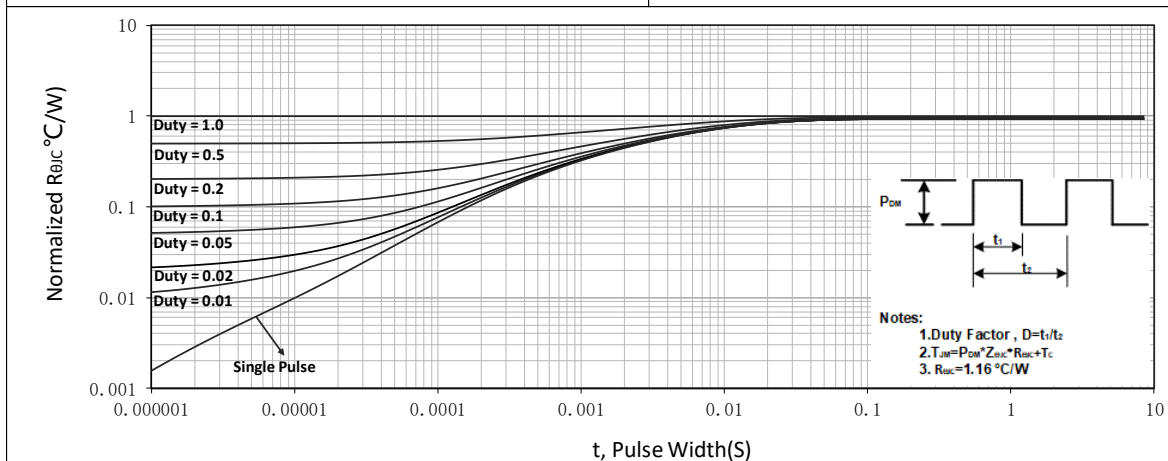
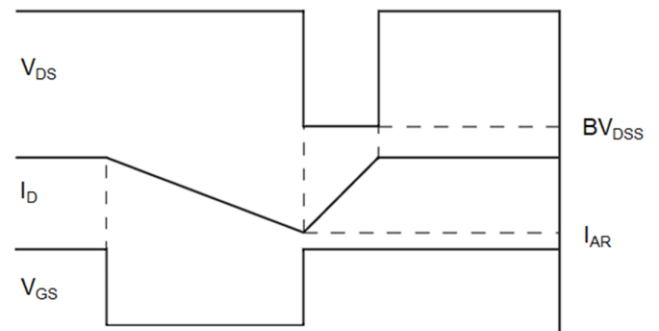
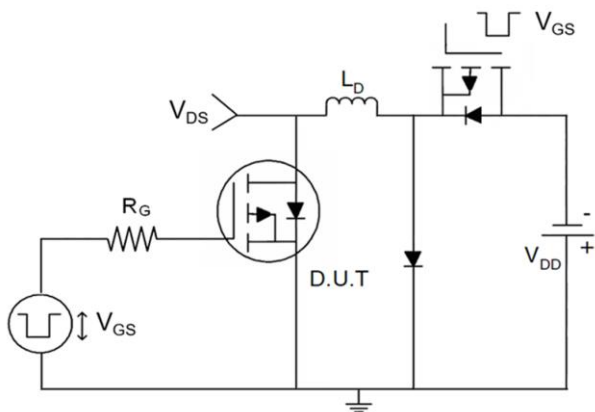
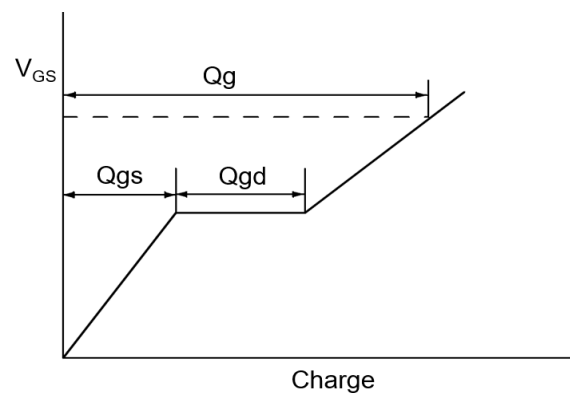
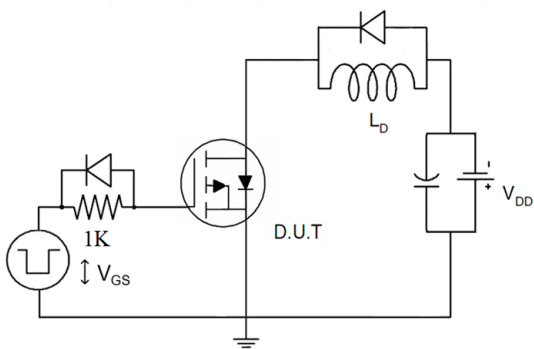


Figure 11. Normalized Maximum Transient Thermal Impedance

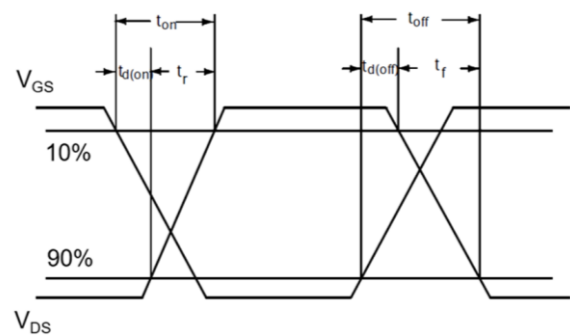
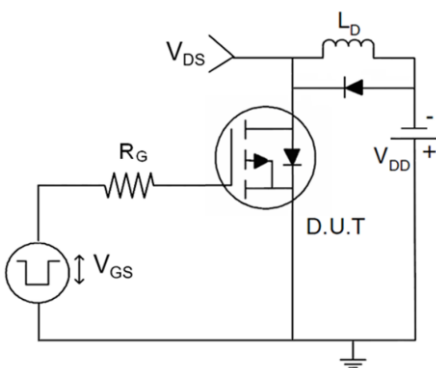
### 1) $E_{AS}$ Test Circuits



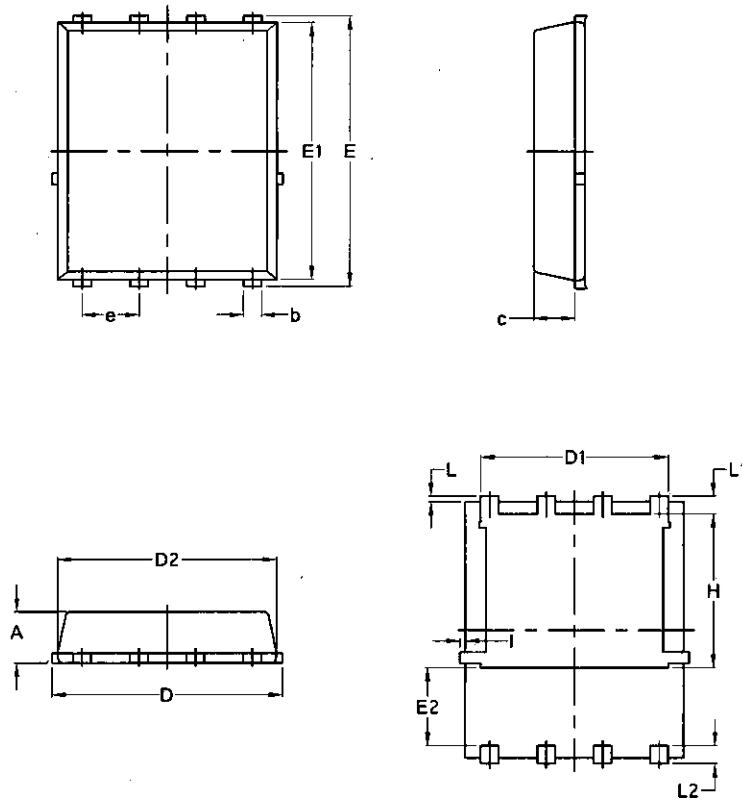
### 2) Gate Charge Test Circuit



### 3) Switch Time Test Circuit



## Package Mechanical Data-PDFN5060-8L -Single



| Symbol | Common   |        |          |        |
|--------|----------|--------|----------|--------|
|        | mm       |        | Inch     |        |
|        | Mim      | Max    | Min      | Max    |
| A      | 1.03     | 1.17   | 0.0406   | 0.0461 |
| b      | 0.34     | 0.48   | 0.0134   | 0.0189 |
| c      | 0.824    | 0.0970 | 0.0324   | 0.082  |
| D      | 4.80     | 5.40   | 0.1890   | 0.2126 |
| D1     | 4.11     | 4.31   | 0.1618   | 0.1697 |
| D2     | 4.80     | 5.00   | 0.1890   | 0.1969 |
| E      | 5.95     | 6.15   | 0.2343   | 0.2421 |
| E1     | 5.65     | 5.85   | 0.2224   | 0.2303 |
| E2     | 1.60     | /      | 0.0630   | /      |
| e      | 1.27 BSC |        | 0.05 BSC |        |
| L      | 0.05     | 0.25   | 0.0020   | 0.0098 |
| L1     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| L2     | 0.38     | 0.50   | 0.0150   | 0.0197 |
| H      | 3.30     | 3.50   | 0.1299   | 0.1378 |
| I      | /        | 0.18   | /        | 0.0070 |