



## Description

The HFDD050N03B uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

## General Features

$V_{DS} = 30V$   $I_D = 100A$

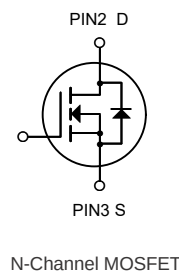
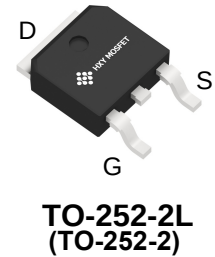
$R_{DS(ON)} < 5m\Omega$  @  $V_{GS}=10V$

## Application

Battery protection

Load switch

Uninterruptible power supply



## Package Marking and Ordering Information

| Product ID  | Pack                | Brand      | Qty(PCS) |
|-------------|---------------------|------------|----------|
| HFDD050N03B | TO 252-2L(TO-252-2) | HXY MOSFET | 2500     |

## Absolute Maximum Ratings (TC=25°C unless otherwise noted)

| Symbol                 | Parameter                                                       | Rating     |      | Units |
|------------------------|-----------------------------------------------------------------|------------|------|-------|
| VDS                    | Drain- Source Voltage                                           | 30         |      | V     |
| VGS                    | Gate-Source Voltage                                             | $\pm 20$   |      | V     |
| $I_D@T_C=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>           | 100        |      | A     |
| $I_D@T_C=100^{\circ}C$ | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>           | 57         |      | A     |
| $I_D@T_A=25^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>           | 27         | 17   | A     |
| $I_D@T_A=70^{\circ}C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup>           | 23         | 14.5 | A     |
| $I_{DM}$               | Pulsed Drain Current <sup>2</sup>                               | 160        |      | A     |
| EAS                    | Single Pulse Avalanche Energy <sup>3</sup>                      | 115.2      |      | mJ    |
| $I_{AS}$               | Avalanche Current                                               | 48         |      | A     |
| $P_D@T_C=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                            | 53         |      | W     |
| $P_D@T_A=25^{\circ}C$  | Total Power Dissipation <sup>4</sup>                            | 6          | 2.4  | W     |
| $T_{STG}$              | Storage Temperature Range                                       | -55 to 175 |      | °C    |
| $T_J$                  | Operating Junction Temperature Range                            | -55 to 175 |      | °C    |
| $R_{\theta JA}$        | Thermal Resistance Junction-ambient (Steady State) <sup>1</sup> | 62         |      | °C/W  |
| $R_{\theta JA}$        | Thermal Resistance Junction-Ambient <sup>1</sup> (t ≤ 10s)      | 25         |      | °C/W  |
| $R_{\theta JC}$        | Thermal Resistance Junction-Case <sup>1</sup>                   | 2.8        |      | °C/W  |



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

| Symbol                              | Parameter                                      | Conditions                                                                            | Min. | Typ.  | Max. | Unit  |
|-------------------------------------|------------------------------------------------|---------------------------------------------------------------------------------------|------|-------|------|-------|
| BV <sub>DSS</sub>                   | Drain-Source Breakdown Voltage                 | V <sub>GS</sub> =0V, I <sub>D</sub> =250uA                                            | 30   | ---   | ---  | V     |
| ΔBV <sub>DSS</sub> /ΔT <sub>J</sub> | BVDSS Temperature Coefficient                  | Reference to 25°C, I <sub>D</sub> =1mA                                                | ---  | 0.028 | ---  | V/°C  |
| R <sub>DS(on)</sub>                 | Static Drain-Source On-Resistance <sup>2</sup> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A                                             | ---  | 3.8   | 5.5  | mΩ    |
|                                     |                                                | V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A                                            | ---  | 7.5   | 9    |       |
| V <sub>GS(th)</sub>                 | Gate Threshold Voltage                         | V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA                              | 1.0  | 1.5   | 2.5  | V     |
| ΔV <sub>GS(th)</sub>                | V <sub>GS(th)</sub> Temperature Coefficient    |                                                                                       | ---  | -6.16 | ---  | mV/°C |
| I <sub>DSS</sub>                    | Drain-Source Leakage Current                   | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C                       | ---  | ---   | 1    | uA    |
|                                     |                                                | V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C                       | ---  | ---   | 5    |       |
| I <sub>GSS</sub>                    | Gate-Source Leakage Current                    | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                            | ---  | ---   | ±100 | nA    |
| g <sub>fs</sub>                     | Forward Transconductance                       | V <sub>DS</sub> =5V, I <sub>D</sub> =30A                                              | ---  | 22    | ---  | S     |
| R <sub>g</sub>                      | Gate Resistance                                | V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz                                      | ---  | 1.7   | 3.4  | Ω     |
| Q <sub>g</sub>                      | Total Gate Charge (4.5V)                       | V <sub>DS</sub> =15V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A                      | ---  | 20    | ---  | nC    |
| Q <sub>gs</sub>                     | Gate-Source Charge                             |                                                                                       | ---  | 7.6   | ---  |       |
| Q <sub>gd</sub>                     | Gate-Drain Charge                              |                                                                                       | ---  | 7.2   | ---  |       |
| T <sub>d(on)</sub>                  | Turn-On Delay Time                             | V <sub>DD</sub> =15V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =15A | ---  | 7.8   | ---  | ns    |
| T <sub>r</sub>                      | Rise Time                                      |                                                                                       | ---  | 15    | ---  |       |
| T <sub>d(off)</sub>                 | Turn-Off Delay Time                            |                                                                                       | ---  | 37.3  | ---  |       |
| T <sub>f</sub>                      | Fall Time                                      |                                                                                       | ---  | 10.6  | ---  |       |
| C <sub>iss</sub>                    | Input Capacitance                              | V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz                                     | ---  | 2295  | ---  | pF    |
| C <sub>oss</sub>                    | Output Capacitance                             |                                                                                       | ---  | 267   | ---  |       |
| C <sub>rss</sub>                    | Reverse Transfer Capacitance                   |                                                                                       | ---  | 210   | ---  |       |
| I <sub>S</sub>                      | Continuous Source Current <sup>1,5</sup>       | V <sub>G</sub> =V <sub>D</sub> =0V, Force Current                                     | ---  | ---   | 80   | A     |
| I <sub>SM</sub>                     | Pulsed Source Current <sup>2,5</sup>           |                                                                                       | ---  | ---   | 160  | A     |
| V <sub>SD</sub>                     | Diode Forward Voltage <sup>2</sup>             | V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C                         | ---  | ---   | 1    | V     |
| t <sub>rr</sub>                     | Reverse Recovery Time                          | I <sub>F</sub> =30A, dI/dt=100A/μs, T <sub>J</sub> =25°C                              | ---  | 14    | ---  | nS    |
| Q <sub>rr</sub>                     | Reverse Recovery Charge                        |                                                                                       | ---  | 5     | ---  | nC    |

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper.
- 2.The data tested by pulsed , pulse width .The EAS data shows Max. rating .
- 3.The test cond≤300us , duty cycle ition is V<sub>DD</sub>=25≤V,V 2%<sub>GS</sub>=10V,L=0.1mH,I<sub>AS</sub>=53.8A
- 4.The power dissipation is limited by 175°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



## Typical Characteristics

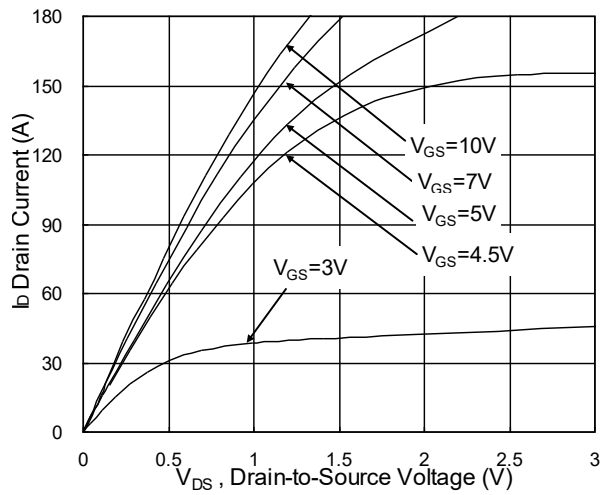


Fig.1 Typical Output Characteristics

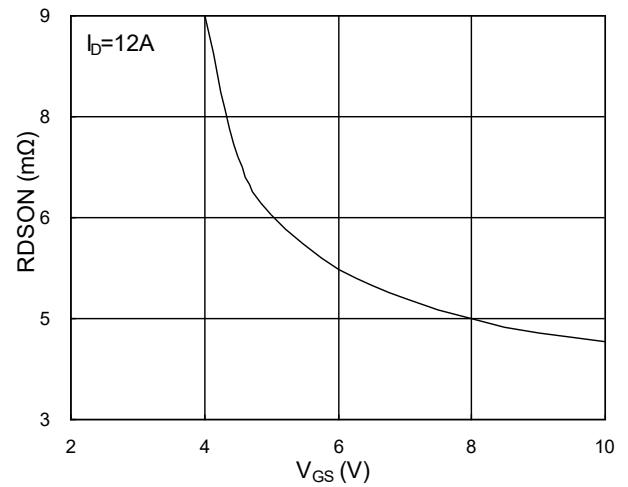


Fig.2 On-Resistance vs. G-S Voltage

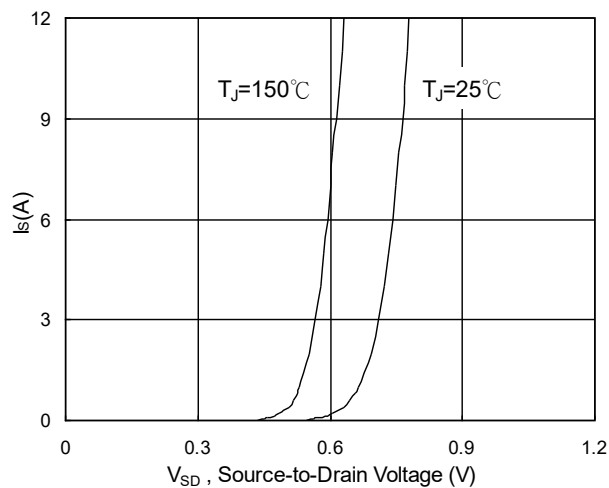


Fig.3 Forward Characteristics of Reverse

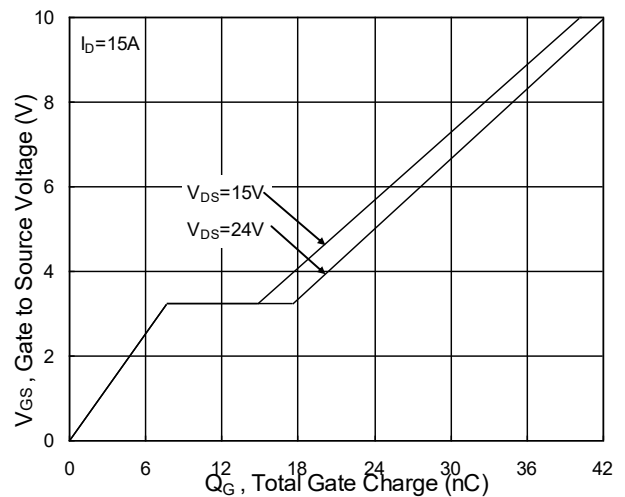


Fig.4 Gate-Charge Characteristics

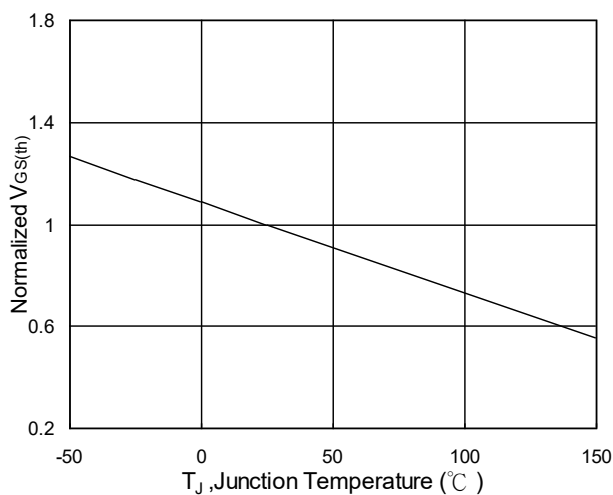


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

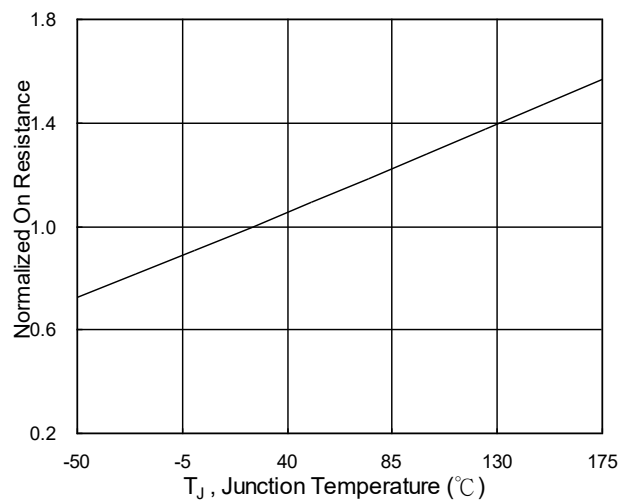


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$

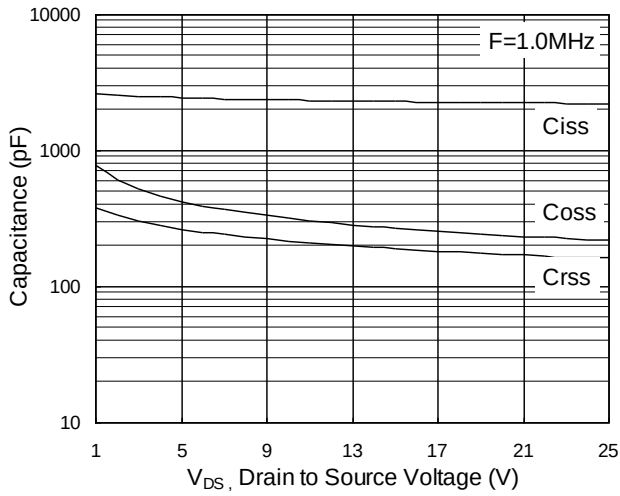


Fig.7 Capacitance

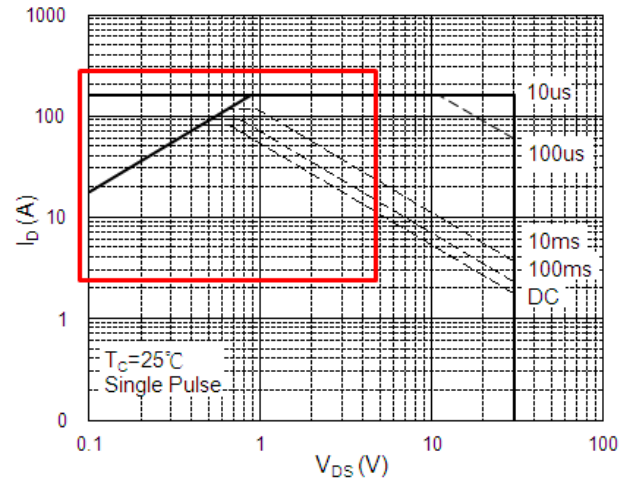


Fig.8 Safe Operating Area

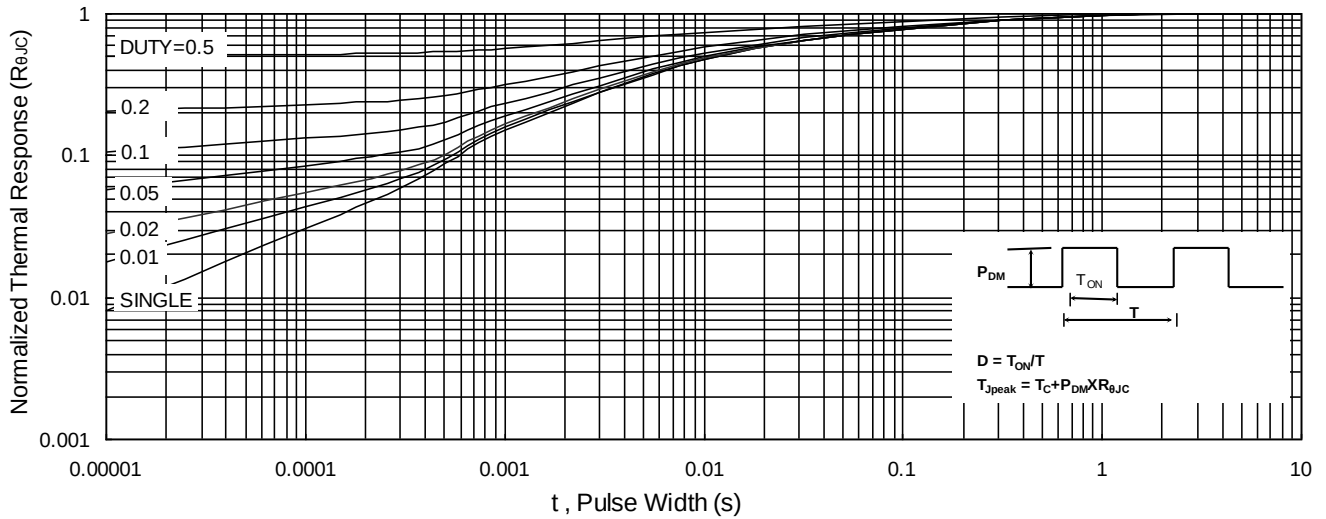


Fig.9 Normalized Maximum Transient Thermal Impedance

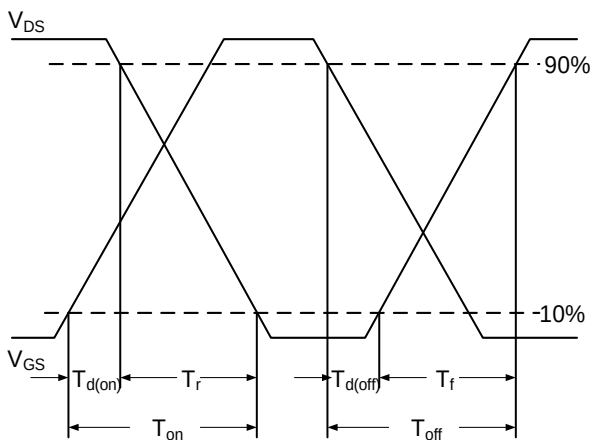


Fig.10 Switching Time Waveform

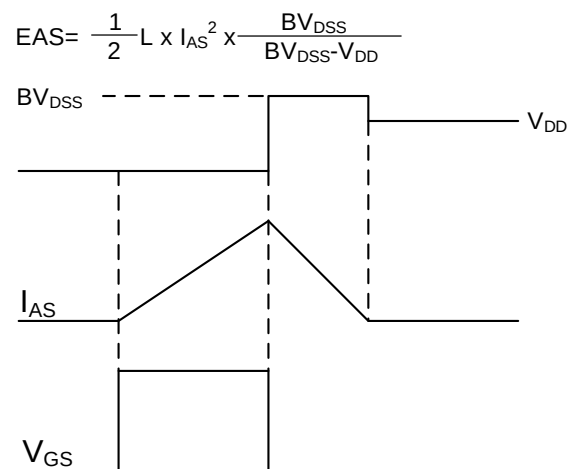
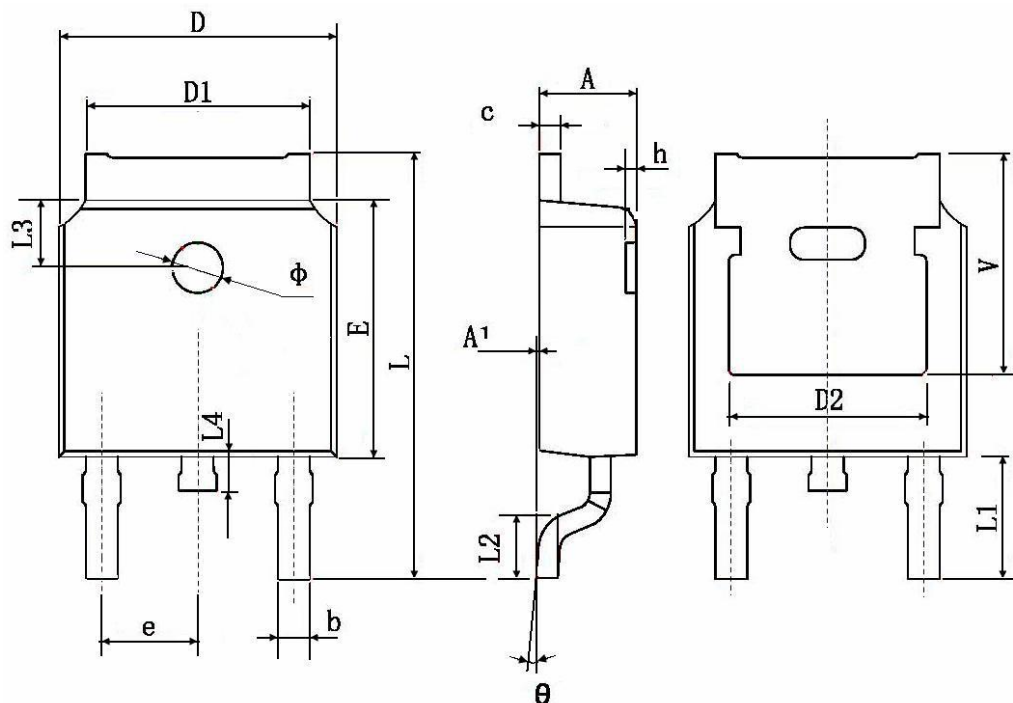


Fig.11 Unclamped Inductive Switching Waveform



## TO252-2L(TO-252-2) Package Information



| Symbol | Dimensions In Millimeters |        | Dimensions In Inches |       |
|--------|---------------------------|--------|----------------------|-------|
|        | Min.                      | Max.   | Min.                 | Max.  |
| A      | 2.200                     | 2.400  | 0.087                | 0.094 |
| A1     | 0.000                     | 0.127  | 0.000                | 0.005 |
| b      | 0.660                     | 0.860  | 0.026                | 0.034 |
| c      | 0.460                     | 0.580  | 0.018                | 0.023 |
| D      | 6.500                     | 6.700  | 0.256                | 0.264 |
| D1     | 5.100                     | 5.460  | 0.201                | 0.215 |
| D2     | 0.483 TYP.                |        | 0.190 TYP.           |       |
| E      | 6.000                     | 6.200  | 0.236                | 0.244 |
| e      | 2.186                     | 2.386  | 0.086                | 0.094 |
| L      | 9.800                     | 10.400 | 0.386                | 0.409 |
| L1     | 2.900 TYP.                |        | 0.114 TYP.           |       |
| L2     | 1.400                     | 1.700  | 0.055                | 0.067 |
| L3     | 1.600 TYP.                |        | 0.063 TYP.           |       |
| L4     | 0.600                     | 1.000  | 0.024                | 0.039 |
| Φ      | 1.100                     | 1.300  | 0.043                | 0.051 |
| θ      | 0°                        | 8°     | 0°                   | 8°    |
| h      | 0.000                     | 0.300  | 0.000                | 0.012 |
| V      | 5.350 TYP.                |        | 0.211 TYP.           |       |



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