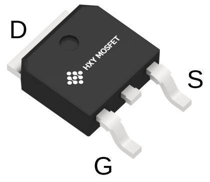
HUAXUANYANG HXY
ELECTRONICS CO.,LTD

# AM140N03-03D

N-Channel Enhancement Mode MOSFET

## Description

The AM140N03-03D 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.

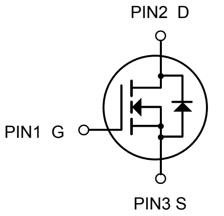


**TO-252-2L**

## General Features

$V_{DS}$ = 30V $I_D$ =150A

$R_{DS(ON)}$ < 2.9 mΩ@ $V_{GS}$=10V



N-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

| Product ID | Pack | Brand | Qty(PCS) |
|---|---|---|---|
| AM140N03-03D | TO-252-2L | HXY MOSFET | 2500 |

## Absolute Maximum Ratings ($T_C$=25℃unless otherwise noted)

| Symbol | Parameter | Rating | Units |
|---|---|---|---|
| $V_{DS}$ | Drain-Source Voltage | 30 | V |
| $V_{GS}$ | Gate-Source Voltage | ±20 | V |
| $I_D$@$T_C$=25˚C | Continuous Drain Current, $V_{GS}$ @ 10V | 150 | A |
| $I_D$@$T_C$=100˚C | Continuous Drain Current, $V_{GS}$ @ 10V | 80 | A |
| $I_{DM}$ | Pulsed Drain Current | 450 | A |
| EAS | Single Pulse Avalanche Energy | 580 | mJ |
| $I_{AS}$ | Avalanche Current | 60 | A |
| $P_D$@$T_C$=25˚C | Total Power Dissipation | 87 | W |
| $T_{STG}$ | Storage Temperature Range | -55 to 150 | ˚C |
| $T_J$ | Operating Junction Temperature Range | -55 to 150 | ˚C |
| RθJA | Thermal Resistance Junction-Ambient | 62 | ˚C/W |
| RθJC | Thermal Resistance Junction-Case | 2.1 | ˚C/W |

## **Electrical characteristic** ( $T_J$ = 25°C unless otherwise specified )

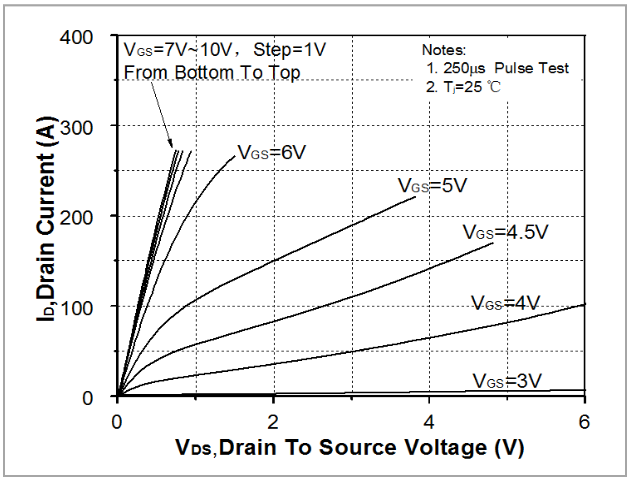
| Symbol | Parameter | Test conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $BV_{DSS}$ | Drain to source breakdown voltage | $V_{GS}$=0V, $I_D$=250uA | 30 | | | V |
| $\Delta BV_{DSS}$ / $\Delta T_J$ | Breakdown voltage temperature coefficient | $I_D$=250uA, referenced to 25°C | | 0.02 | | V/°C |
| $I_{DSS}$ | Drain to source leakage current | $V_{DS}$=30V, $V_{GS}$=0V | | | 1 | uA |
| | | $V_{DS}$=24V, $T_J$=125°C | | | 50 | uA |
| $I_{GSS}$ | Gate to source leakage current, forward | $V_{GS}$=20V, $V_{DS}$=0V | | | 100 | nA |
| | Gate to source leakage current, reverse | $V_{GS}$=-20V, $V_{DS}$=0V | | | -100 | nA |
| $V_{GS(TH)}$ | Gate threshold voltage | $V_{DS}$=$V_{GS}$, $I_D$=250uA | 1.2 | | 2.4 | V |
| $R_{DS(ON)}$ | Drain to source on state resistance | $V_{GS}$=4.5V, $I_D$=30A,$T_J$=25°C | | 2.2 | 4.8 | mΩ |
| | | $V_{GS}$=10V, $I_D$=30A,$T_J$=25°C | | 1.5 | 2.9 | mΩ |
| | | $V_{GS}$=10V, $I_D$=30A,$T_J$=125°C | | 2.5 | | mΩ |
| $G_{fs}$ | Forward transconductance | $V_{DS}$=5V, $I_D$=30A | | 73 | | S |
| $C_{iss}$ | Input capacitance | $V_{GS}$=0V, $V_{DS}$=15V, f=1MHz | | 6272 | | pF |
| $C_{oss}$ | Output capacitance | | | 1022 | | |
| $C_{rss}$ | Reverse transfer capacitance | | | 718 | | |
| $t_{d(on)}$ | Turn on delay time | $V_{DS}$=15V, $I_D$=30A, $R_G$=4.7Ω,<br>$V_{GS}$=10V<br>(note 4,5) | | 20 | | ns |
| $t_r$ | Rising time | | | 58 | | |
| $t_{d(off)}$ | Turn off delay time | | | 158 | | |
| $t_f$ | Fall time | | | 77 | | |
| $Q_g$ | Total gate charge | $V_{DS}$=24V, $V_{GS}$=10V, $I_D$=30A ,<br>$I_G$=5mA<br>(note 4,5) | | 143 | | nC |
| $Q_{gs}$ | Gate-source charge | | | 17 | | |
| $Q_{gd}$ | Gate-drain charge | | | 43 | | |
| $R_g$ | Gate resistance | $V_{DS}$=0V, Scan F mode | | 4.2 | | Ω |
| $I_S$ | Continuous source current | Integral reverse p-n Junction diode in the MOSFET | | | 150 | A |
| $I_{SM}$ | Pulsed source current | | | | 440 | A |
| $V_{SD}$ | Diode forward voltage drop. | $I_S$=45A, $V_{GS}$=0V | | | 1.4 | V |
| $t_{rr}$ | Reverse recovery time | $I_S$=30A, $V_{GS}$=0V,<br>$dI_F/dt$=100A/us | | 26 | | ns |
| $Q_{rr}$ | Reverse recovery charge | | | 10 | | nC |

※. Notes

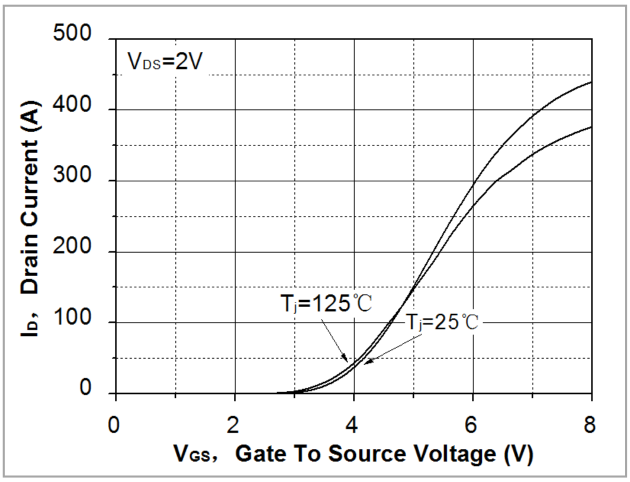
1. Repeatitive rating : pulse width limited by junction temperature.
2. L =0.5mH, $I_{AS}$ =48A, $V_{DD}$=30V, $R_G$=25Ω, Starting $T_J$ = 25°C
3. $I_{SD}$ ≤30A, di/dt = 100A/us, $V_{DD}$ ≤ $BV_{DSS}$, Staring $T_J$ =25°C
4. Pulse Test : Pulse Width ≤ 300us, duty cycle ≤ 2%.

## Typical Characteristics

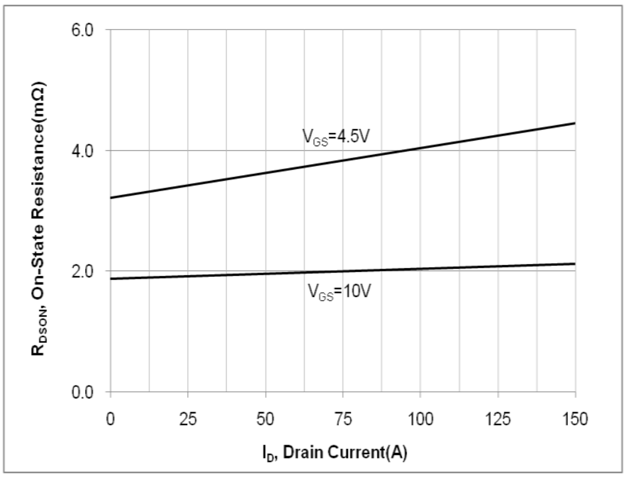
### Fig. 1. On-state characteristics



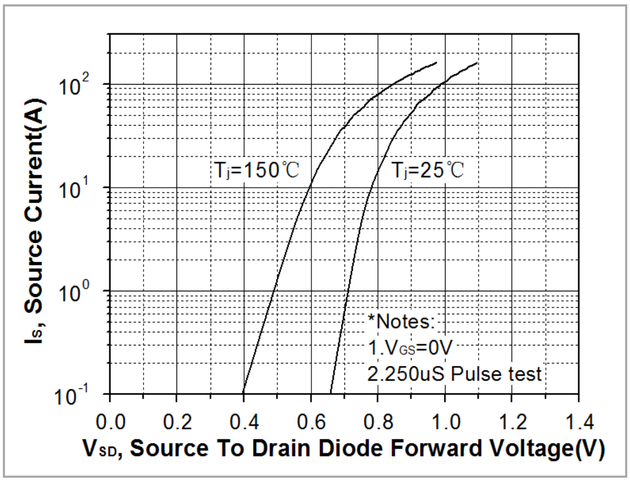
### Fig. 2. Transfer Characteristics



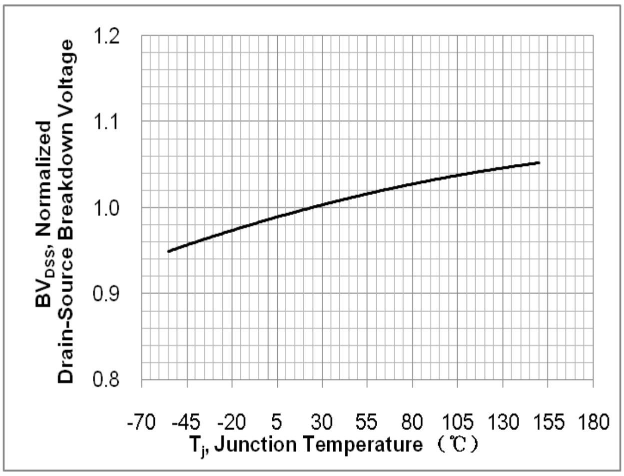
### Fig. 3. On-resistance variation vs. drain current and gate voltage



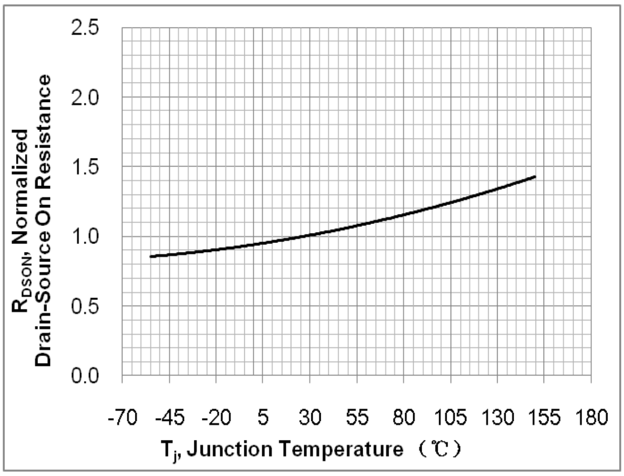
### Fig. 4. On-state current vs. diode forward voltage



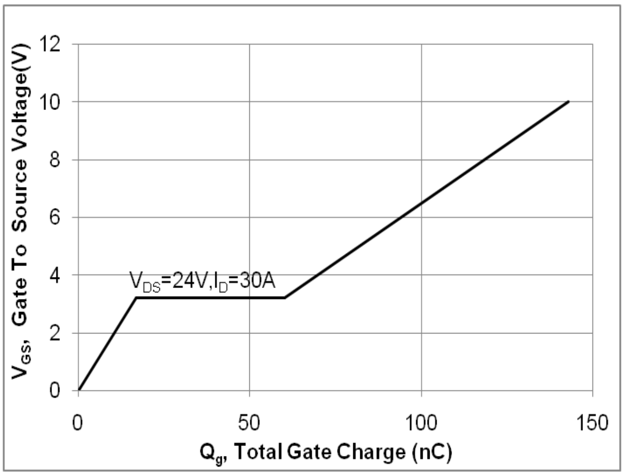
### Fig 5. Breakdown voltage variation vs. junction temperature



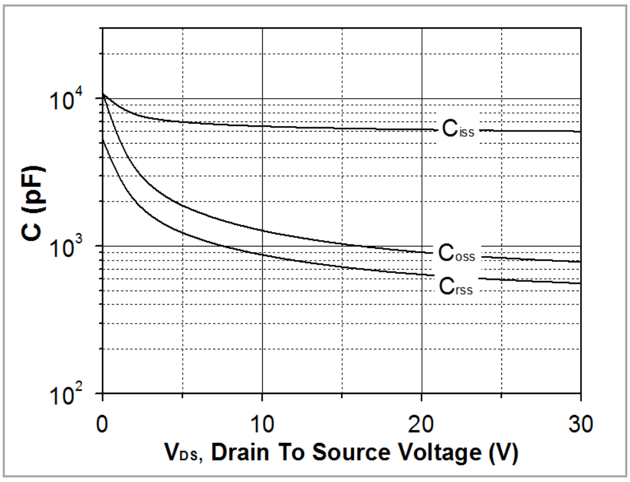
### Fig. 6. On-resistance variation vs. junction temperature



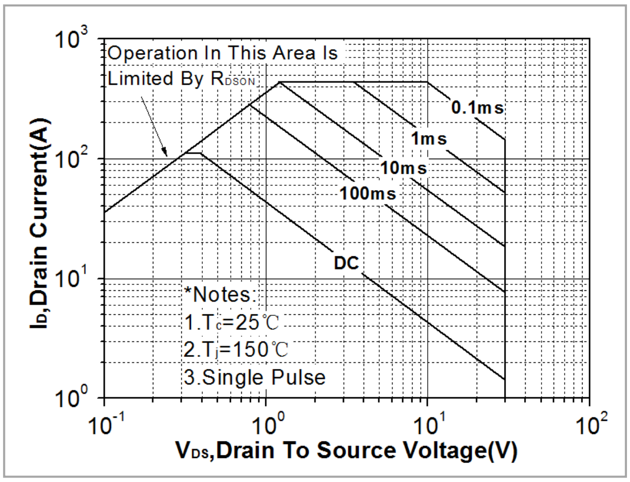
### Fig. 7. Gate charge characteristics



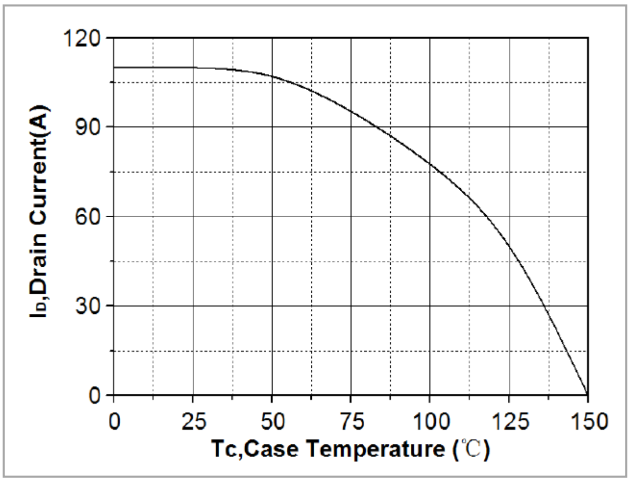
### Fig. 8. Capacitance Characteristics



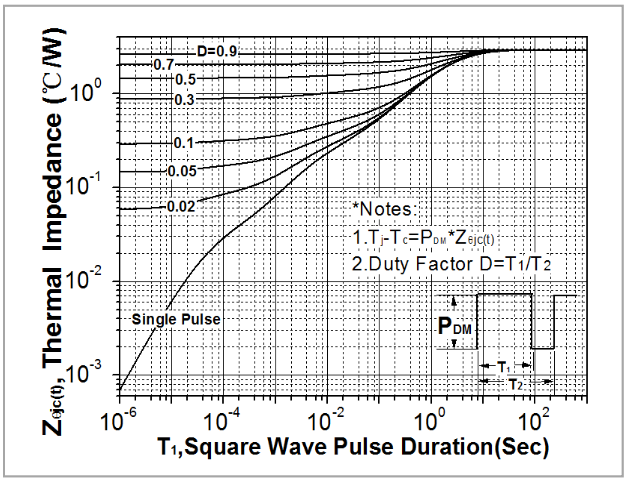
### Fig. 9. Maximum safe operating area



### Fig. 10. Maximum drain current vs. case temperature



### Fig. 11. Transient thermal response curve



## Test Circuit

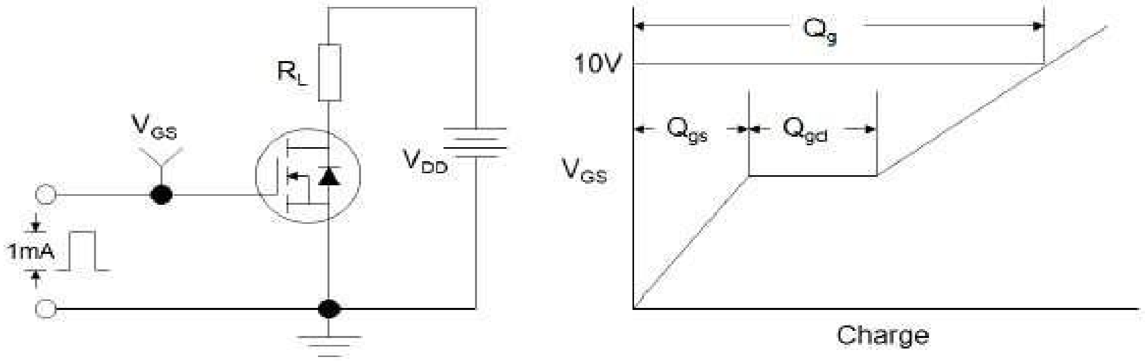


Figure1:Gate Charge Test Circuit & Waveform

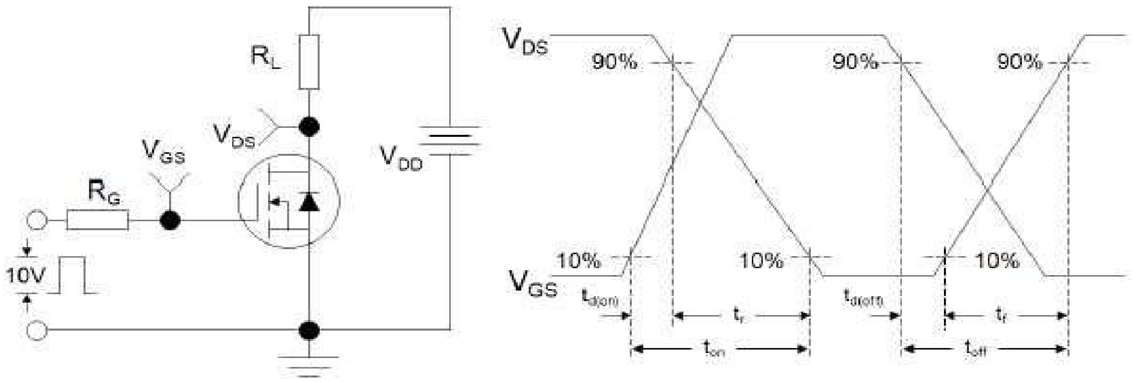


Figure 2: Resistive Switching Test Circuit & Waveforms

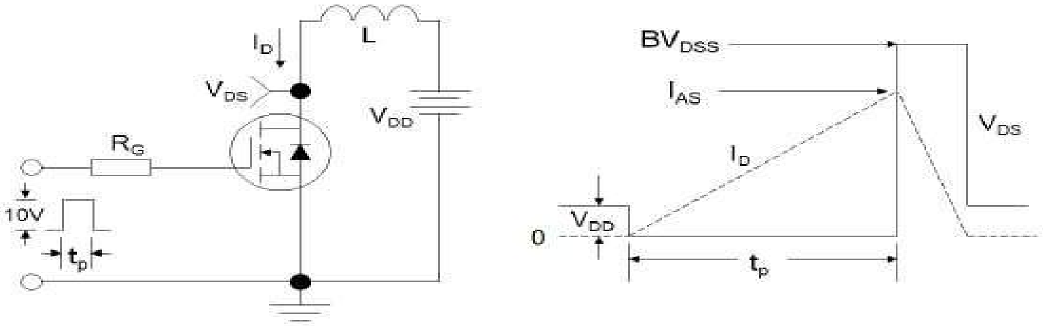
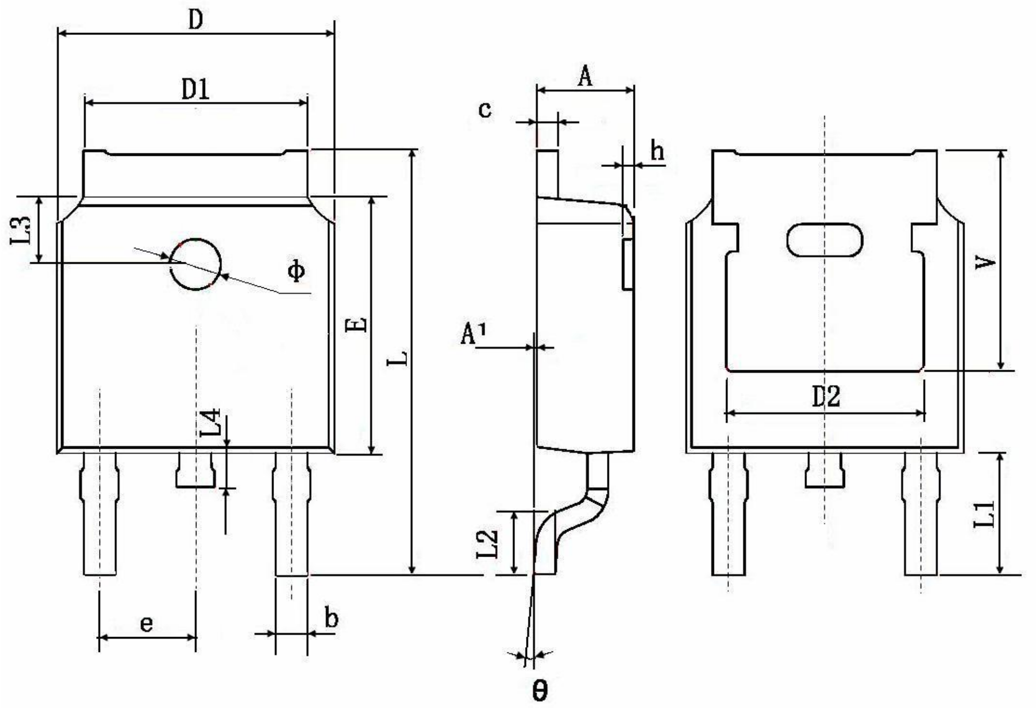


Figure 3:Unclamped Inductive Switching Test Circuit & Waveforms

## TO-252-2L 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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