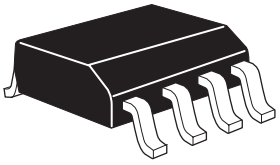
# ZXMC3A18DN8

## ADVANCE INFORMATION

## COMPLEMENTARY 30V ENHANCEMENT MODE MOSFET

### SUMMARY

**N-Channel = $V_{(BR)DSS}$= 30V : $R_{DS(on)}$= 0.025Ω; $I_D$= 7.6A**
**P-Channel = $V_{(BR)DSS}$= -30V : $R_{DS(on)}$= 0.035Ω; $I_D$= -6.3A**



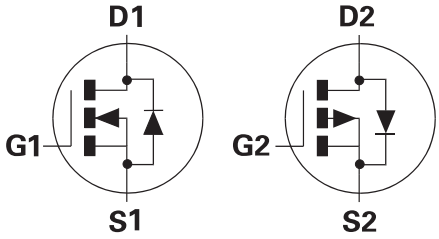
**SO8**

### DESCRIPTION

This new generation of trench MOSFETs from Zetex utilizes a unique structure that combines the benefits of low on-resistance with fast switching speed. This makes them ideal for high efficiency, low voltage, power management applications.

### FEATURES

- Low on-resistance
- Fast switching speed
- Low threshold
- Low gate drive
- Low profile SOIC package




**Q1 = N-channel** **Q2 = P-channel**

### APPLICATIONS

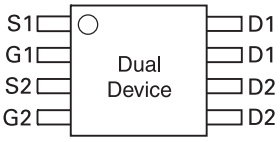
- Motor Drive
- LCD backlighting

### ORDERING INFORMATION

| DEVICE | REEL SIZE | TAPE WIDTH | QUANTITY PER REEL |
|---|---|---|---|
| ZXMC3A18DN8TA | 7" | 12mm | 500 units |
| ZXMC3A18DN8TC | 13" | 12mm | 2500 units |

### DEVICE MARKING

- ZXMC
  3A18




**Top View**



ZETEX SEMICONDUCTORS

## ABSOLUTE MAXIMUM RATINGS

| PARAMETER | SYMBOL | LIMIT | UNIT | |
|---|---|---|---|---|
| Drain-Source Voltage | $V_{DSS}$ | 30 | -30 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | ±20 | V |
| Continuous Drain Current<br>($V_{GS}$= 10V; $T_A$=25°C) (b)(d)<br>($V_{GS}$= 10V; $T_A$=70°C) (b)(d)<br>($V_{GS}$= 10V; $T_A$=25°C) (a)(d) | $I_D$ | <br>7.6<br>6.1<br>5.8 | <br>-6.3<br>-5.0<br>-4.8 | <br>A<br>A<br>A |
| Pulsed Drain Current (c) | $I_{DM}$ | 37 | -30 | A |
| Continuous Source Current (Body Diode) (b) | $I_S$ | 3.6 | tbd | A |
| Pulsed Source Current (Body Diode) (c) | $I_{SM}$ | 37 | 30 | A |
| Power Dissipation at $T_A$ =25°C (a) (d)<br>Linear Derating Factor | $P_D$ | 1.25<br>10 | | W<br>mW/°C |
| Power Dissipation at $T_A$ =25°C (a) (e)<br>Linear Derating Factor | $P_D$ | 1.8<br>14 | | W<br>mW/°C |
| Power Dissipation at $T_A$ =25°C (b) (d)<br>Linear Derating Factor | $P_D$ | 2.1<br>17 | | W<br>mW/°C |
| Operating and Storage Temperature Range | $T_j$, $T_{stg}$ | -55 to +150 | | °C |

## THERMAL RESISTANCE

| PARAMETER | SYMBOL | VALUE | UNIT |
|---|---|---|---|
| Junction to Ambient (a) (d) | $R_{\Theta JA}$ | 100 | °C/W |
| Junction to Ambient (a) (e) | $R_{\Theta JA}$ | 70 | °C/W |
| Junction to Ambient (b) (d) | $R_{\Theta JA}$ | 60 | °C/W |

NOTES

(a) For a device surface mounted on 25mm x 25mm FR4 PCB with high coverage of single sided 1oz copper, in still air conditions.

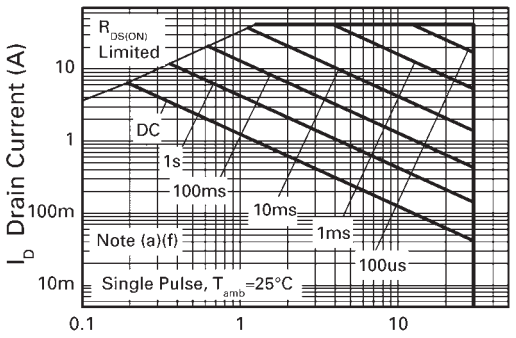
(b) For a device surface mounted on FR4 PCB measured at t ≤ 10 sec.

(c) Repetitive rating - pulse width limited by maximum junction temperature. Pulse width 300μs, d<= 0.02. Refer to Transient Thermal Impedance graph.

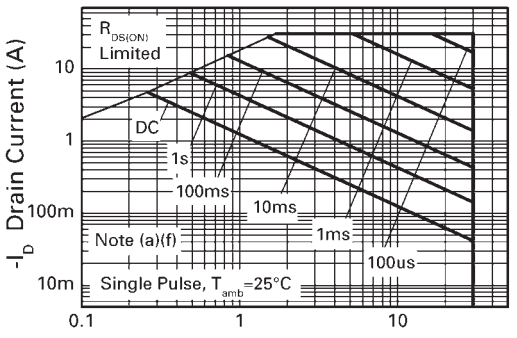
(d) For device with one active die.

(e) For device with two active die running at equal power.

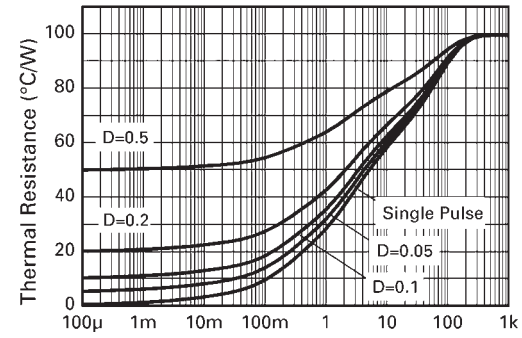
## CHARACTERISTICS



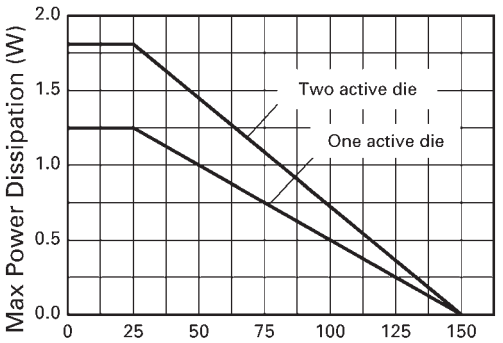

**N-channel Safe Operating Area**



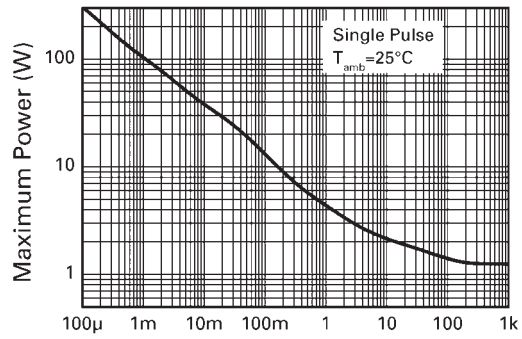

**P-channel Safe Operating Area**




**Transient Thermal Impedance**




**Derating Curve**




**Pulse Power Dissipation**

## N-Channel

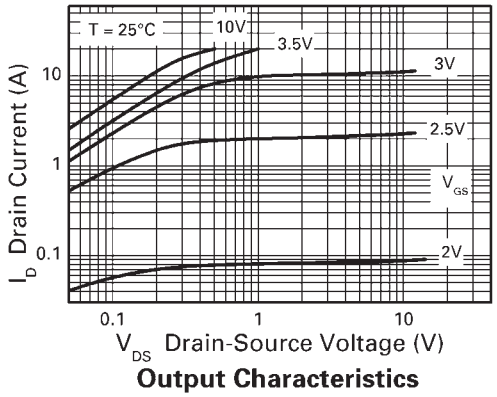
**ELECTRICAL CHARACTERISTICS** (at $T_{amb}$ = 25°C unless otherwise stated)

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | 30 | | | V | $I_D$= 250μA, $V_{GS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | 0.5 | μA | $V_{DS}$=30V, $V_{GS}$=0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | 1.0 | | | V | $I_D$= 250μA, $V_{DS}$=$V_{GS}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 0.025<br>0.030 | Ω<br>Ω | $V_{GS}$= 10V, $I_D$= 5.8A<br>$V_{GS}$= 4.5V, $I_D$= 5.3A |
| Forward Transconductance (1) (3) | $g_{fs}$ | | 17.5 | | S | $V_{DS}$= 15V, $I_D$= 5.8A |
| **DYNAMIC (3)** | | | | | | |
| Input Capacitance | $C_{iss}$ | | 1800 | | pF | $V_{DS}$= 25V, $V_{GS}$=0V<br>f=1MHz |
| Output Capacitance | $C_{oss}$ | | 289 | | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 178 | | pF | |
| **SWITCHING (2) (3)** | | | | | | |
| Turn-On-Delay Time | $t_{d(on)}$ | | 5.5 | | ns | $V_{DD}$= 15V, $I_D$=6A<br>$R_G \cong 6.0\Omega$,<br>$V_{GS}$ = 10V |
| Rise Time | $t_r$ | | 8.7 | | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 33 | | ns | |
| Fall Time | $t_f$ | | 8.5 | | ns | |
| Gate Charge | $Q_g$ | | 19.4 | | nC | $V_{DS}$= 15V, $V_{GS}$= 5V<br>$I_D$= 3.5A |
| Total Gate Charge | $Q_g$ | | 36 | | nC | $V_{DS}$= 15V, $V_{GS}$= 10V<br>$I_D$= 3.5A |
| Gate-Source Charge | $Q_{gs}$ | | 5.5 | | nC | |
| Gate-Drain Charge | $Q_{gd}$ | | 7.0 | | nC | |
| **SOURCE-DRAIN DIODE** | | | | | | |
| Diode Forward Voltage (1) | $V_{SD}$ | | | 0.95 | V | $T_j$=25°C, $I_S$= 6A,<br>$V_{GS}$=0V |
| Reverse Recovery Time (3) | $t_{rr}$ | | 20.5 | | ns | $T_j$=25°C, $I_F$= 6A,<br>di/dt=100A/μs |
| Reverse Recovery Charge (3) | $Q_{rr}$ | | 41.5 | | nC | |

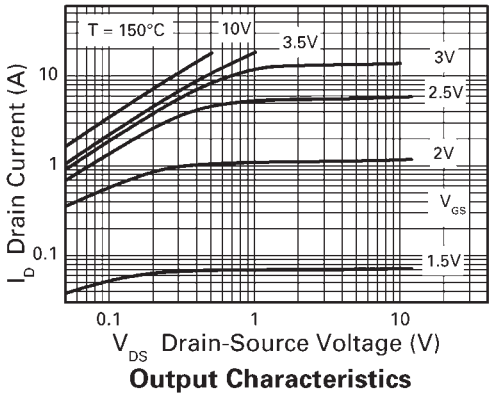
**NOTES**

(1) Measured under pulsed conditions. Pulse width ≤ 300ms; Duty cycle ≤ 2%.
(2) Switching characteristics are independent of operating junction temperature.
(3) For design aid only, not subject to production testing.

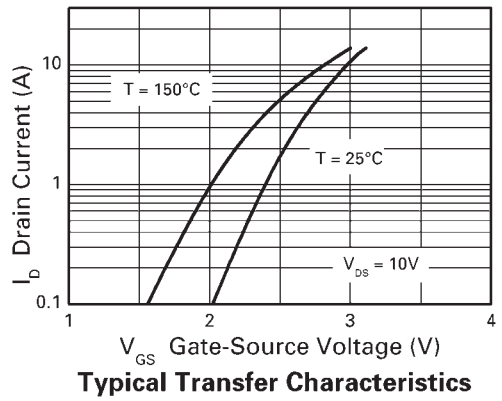
## TYPICAL CHARACTERISTICS



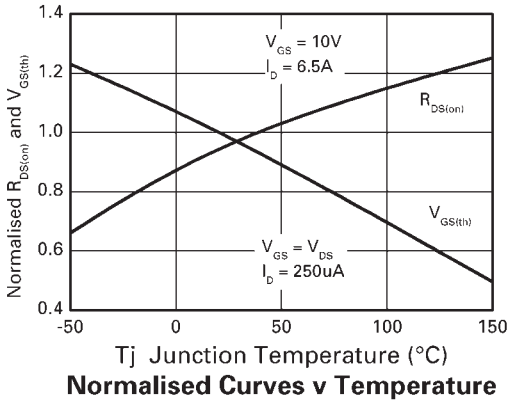

**Output Characteristics**



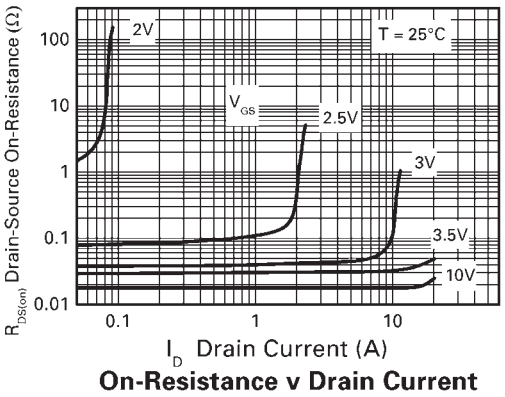

**Output Characteristics**



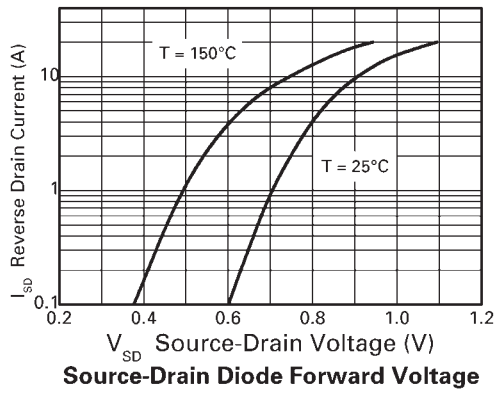

**Typical Transfer Characteristics**




**Normalised Curves v Temperature**

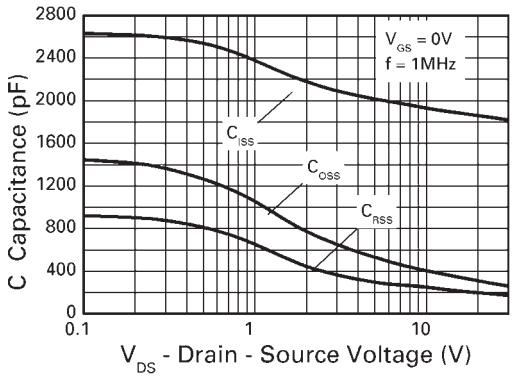



**On-Resistance v Drain Current**

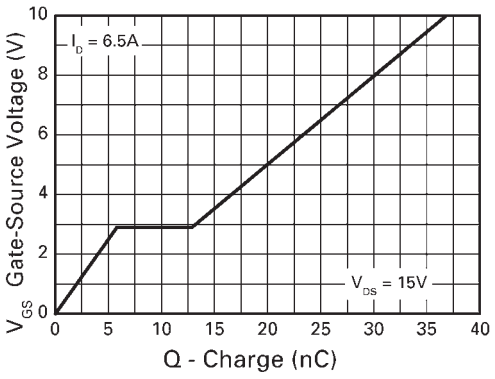



**Source-Drain Diode Forward Voltage**

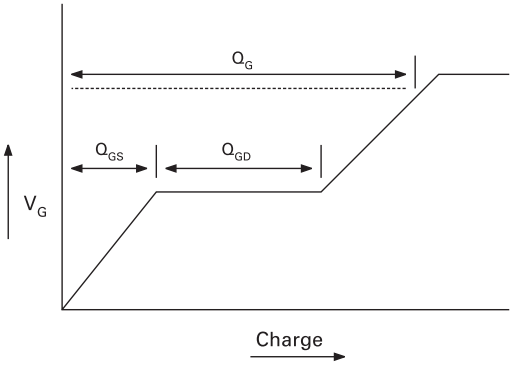
## TYPICAL CHARACTERISTICS



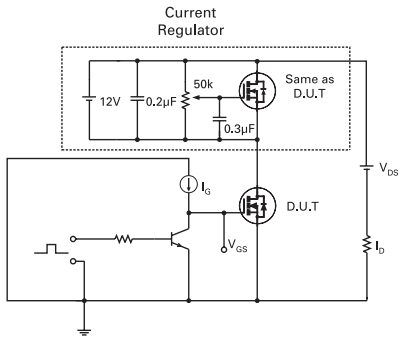

**Capacitance v Drain-Source Voltage**



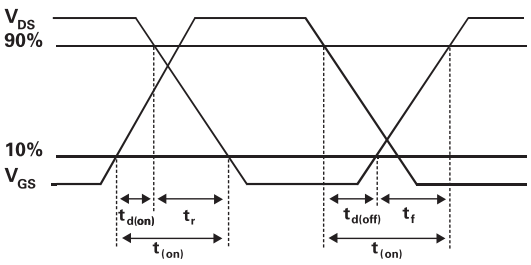

**Gate-Source Voltage v Gate Charge**



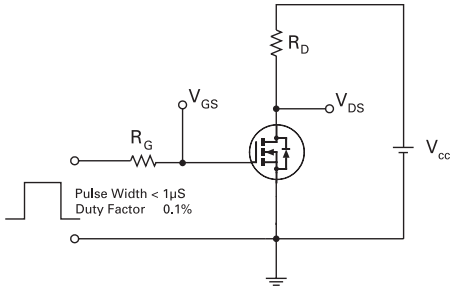

**Basic Gate Charge Waveform**




**Gate Charge Test Circuit**




**Switching Time Waveforms**




**Switching Time Test Circuit**

## P-Channel

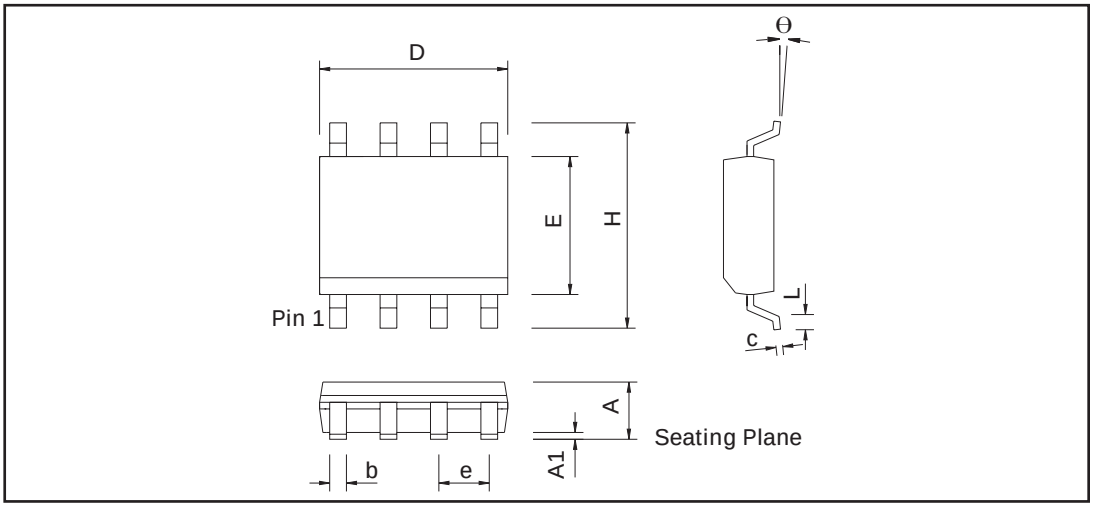
**ELECTRICAL CHARACTERISTICS** (at $T_{amb}$ = 25°C unless otherwise stated)

| PARAMETER | SYMBOL | MIN. | TYP. | MAX. | UNIT | CONDITIONS |
|---|---|---|---|---|---|---|
| **STATIC** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{(BR)DSS}$ | -30 | | | V | $I_D$= -250μA, $V_{GS}$=0V |
| Zero Gate Voltage Drain Current | $I_{DSS}$ | | | -1.0 | μA | $V_{DS}$=-30V, $V_{GS}$=0V |
| Gate-Body Leakage | $I_{GSS}$ | | | 100 | nA | $V_{GS}$=±20V, $V_{DS}$=0V |
| Gate-Source Threshold Voltage | $V_{GS(th)}$ | -1.0 | | | V | $I_D$= 250μA, $V_{DS}$=$V_{GS}$ |
| Static Drain-Source On-State Resistance (1) | $R_{DS(on)}$ | | | 0.035<br>0.050 | Ω<br>Ω | $V_{GS}$= -10V, $I_D$= -4.8A<br>$V_{GS}$= -4.5V, $I_D$= -4.0A |
| Forward Transconductance (1) (3) | $g_{fs}$ | | tbd | | S | $V_{DS}$= -15V, $I_D$= -4.8A |
| **DYNAMIC (3)** | | | | | | |
| Input Capacitance | $C_{iss}$ | | 1630 | | pF | $V_{DS}$= -15V, $V_{GS}$=0V<br>f=1MHz |
| Output Capacitance | $C_{oss}$ | | 320 | | pF | |
| Reverse Transfer Capacitance | $C_{rss}$ | | 210 | | pF | |
| **SWITCHING (2) (3)** | | | | | | |
| Turn-On-Delay Time | $t_{d(on)}$ | | 9.2 | | ns | $V_{DD}$= -15V, $I_D$=-1A<br>$R_G \cong 6.0\Omega$,<br>$V_{GS}$ = 10V |
| Rise Time | $t_r$ | | 18 | | ns | |
| Turn-Off Delay Time | $t_{d(off)}$ | | 96 | | ns | |
| Fall Time | $t_f$ | | 60 | | ns | |
| Gate Charge | $Q_g$ | | tbd | | nC | $V_{DS}$= -15V, $V_{GS}$= -5V<br>$I_D$= -5.0A |
| Total Gate Charge | $Q_g$ | | 41 | | nC | $V_{DS}$= -15V, $V_{GS}$= -10V<br>$I_D$= -5.0A |
| Gate-Source Charge | $Q_{gs}$ | | 5.2 | | nC | |
| Gate-Drain Charge | $Q_{gd}$ | | 7.3 | | nC | |
| **SOURCE-DRAIN DIODE** | | | | | | |
| Diode Forward Voltage (1) | $V_{SD}$ | | | -0.95 | V | $T_j$=25°C, $I_S$= -tbd,<br>$V_{GS}$=0V |
| Reverse Recovery Time (3) | $t_{rr}$ | | tbd | | ns | $T_j$=25°C, $I_F$= -tbd,<br>di/dt=100A/μs |
| Reverse Recovery Charge (3) | $Q_{rr}$ | | tbd | | nC | |

**NOTES**

(1) Measured under pulsed conditions. Pulse width ≤ 300ms; Duty cycle ≤ 2%.
(2) Switching characteristics are independent of operating junction temperature.
(3) For design aid only, not subject to production testing.

## PACKAGE OUTLINE




Controlling dimensions are in millimetres. Approximate conversions are given in inches

## PACKAGE DIMENSIONS

| DIM | Millimetres | | Inches | | DIM | Millimetres | | Inches | |
|---|---|---|---|---|---|---|---|---|---|
| | Min | Max | Min | Max | | Min | Max | Min | Max |
| A | 1.35 | 1.75 | 0.053 | 0.069 | e | 1.27BSC | | 0.050BSC | |
| A1 | 0.10 | 0.25 | 0.004 | 0.010 | b | 0.33 | 0.51 | 0.013 | 0.020 |
| D | 4.80 | 5.00 | 0.189 | 0.197 | c | 0.19 | 0.25 | 0.008 | 0.010 |
| H | 5.80 | 6.20 | 0.228 | 0.244 | θ | 0° | 8° | 0° | 8° |
| E | 3.80 | 4.00 | 0.150 | 0.157 | h | 0.25 | 0.50 | 0.010 | 0.020 |
| L | 0.40 | 1.27 | 0.016 | 0.050 | - | - | - | - | - |



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