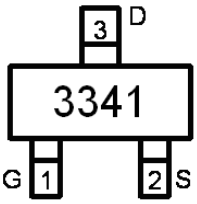
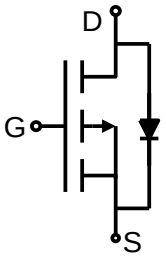
## Main Product Characteristics

| | |
|---|---|
| $V_{DSS}$ | -30V |
| $R_{DS}$(on) | 44mΩ (typ.) |
| $I_D$ | -4.2A ① |

SOT-23




Marking and Pin Assignments




Schematic Diagram

## Features and Benefits

- Advanced MOSFET process technology
- Special designed for PWM, load switching and general purpose applications
- Ultra low on-resistance with low gate charge
- Fast switching and reverse body recovery
- 150℃ operating temperature

## Description

It utilizes the latest processing techniques to achieve the high cell density and reduces the on-resistance with high repetitive avalanche rating. These features combine to make this design an extremely efficient and reliable device for use in power switching application and a wide variety of other applications.

## Absolute Max Rating

| Symbol | Parameter | Max. | Units |
|---|---|---|---|
| $I_D$ @ $T_C$ = 25°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | -4.2 | A |
| $I_D$ @ $T_C$ = 70°C | Continuous Drain Current, $V_{GS}$ @ 10V ① | -3.5 | |
| $I_{DM}$ | Pulsed Drain Current ② | -30 | |
| $P_D$ @$T_C$ = 25°C | Power Dissipation ③ | 1.4 | W |
| $V_{DS}$ | Drain-Source Voltage | -30 | V |
| $V_{GS}$ | Gate-to-Source Voltage | ±12 | V |
| $T_J$ $T_{STG}$ | Operating Junction and Storage Temperature Range | -55 to +150 | °C |

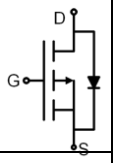
## Thermal Resistance

| Symbol | Characterizes | Typ. | Max. | Units |
|---|---|---|---|---|
| $R_{\theta JA}$ | Junction-to-ambient (t ≤ 10s) ④ | — | 90 | °C /W |

## Electrical Characterizes

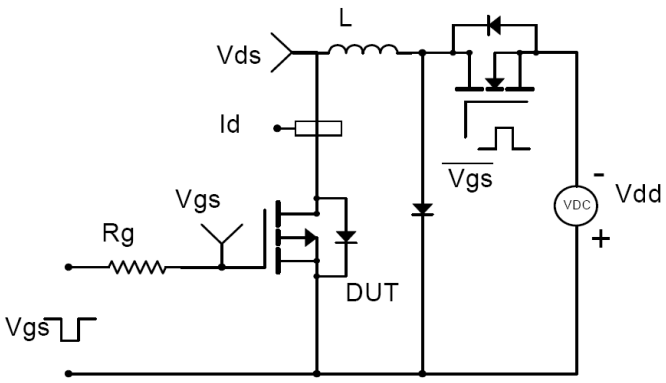
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | Drain-to-Source breakdown voltage | -30 | — | — | V | $V_{GS}$ = 0V, $I_D$ = -250μA |
| $R_{DS(on)}$ | Static Drain-to-Source on-resistance | — | 44 | 55 | mΩ | $V_{GS}$=-10V,$I_D$ = -4A |
| | | — | 52 | 75 | | $V_{GS}$=-4.5V,$I_D$ = -3A |
| $V_{GS(th)}$ | Gate threshold voltage | -0.6 | — | -1.3 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = -250μA |
| $I_{DSS}$ | Drain-to-Source leakage current | — | — | -1 | μA | $V_{DS}$ = -30V,$V_{GS}$ = 0V |
| $I_{GSS}$ | Gate-to-Source forward leakage | — | — | 100 | nA | $V_{GS}$ =12V |
| | | — | — | -100 | | $V_{GS}$ = -12V |
| $Q_g$ | Total gate charge | — | 11 | — | nC | $I_D$ = -4A, |
| $Q_{gs}$ | Gate-to-Source charge | — | 2.1 | — | | $V_{DS}$=-15V, |
| $Q_{gd}$ | Gate-to-Drain("Miller") charge | — | 2.7 | — | | $V_{GS}$ = -4.5V |
| $t_{d(on)}$ | Turn-on delay time | — | 9.8 | — | ns | $V_{GS}$=-4.5V, $V_{DD}$ =-20V, $R_{GEN}$=3Ω, $R_L$=20Ω |
| $t_r$ | Rise time | — | 11 | — | | |
| $t_{d(off)}$ | Turn-Off delay time | — | 25 | — | | |
| $t_f$ | Fall time | — | 8 | — | | |
| $C_{iss}$ | Input capacitance | — | 758 | — | pF | $V_{GS}$ = 0V, |
| $C_{oss}$ | Output capacitance | — | 64 | — | | $V_{DS}$ =-20V, |
| $C_{rss}$ | Reverse transfer capacitance | — | 53 | — | | $f$ = 1MHz |

## Source-Drain Ratings and Characteristics

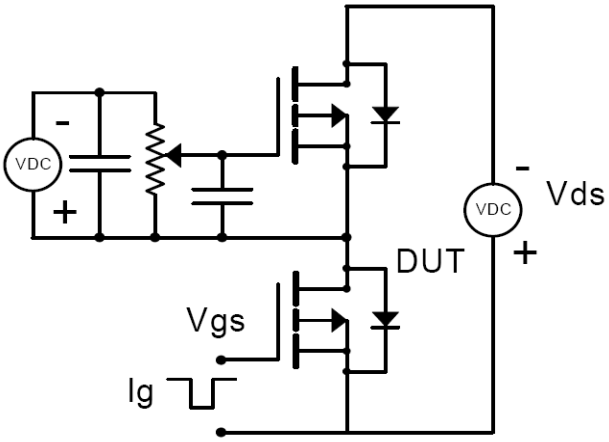
| Symbol | Parameter | Min. | Typ. | Max. | Units | Conditions |
|---|---|---|---|---|---|---|
| $I_S$ | Continuous Source Current (Body Diode) ① | — | — | -4.2 | A | MOSFET symbol showing the integral reverse p-n junction diode.   |
| $I_{SM}$ | Pulsed Source Current (Body Diode) | — | — | -30 | A | |
| $V_{SD}$ | Diode Forward Voltage | — | -0.78 | -1.0 | V | $I_S$=-1A, $V_{GS}$=0V |

## Test Circuits and Waveforms

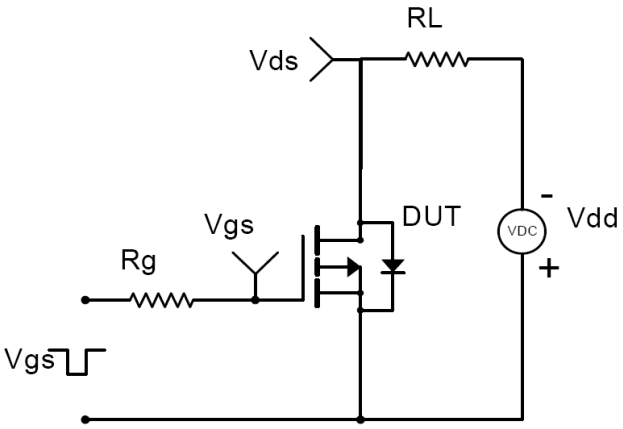
**EAS Test Circuit**



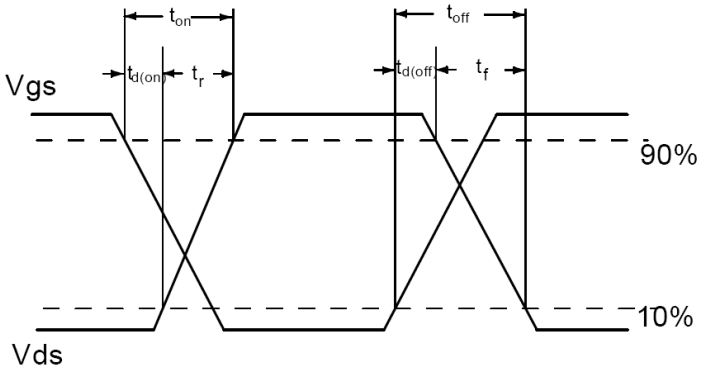

**Gate Charge Test Circuit**




**Switching Time Test Circuit**




**Switch Waveforms**




## Notes:

①Calculated continuous current based on maximum allowable junction temperature.

②Repetitive rating; pulse width limited by max. junction temperature.

③The power dissipation PD is based on max. junction temperature, using junction-to-case thermal resistance.

④The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with $T_A$ =25°C

## Typical Electrical and Thermal Characteristics

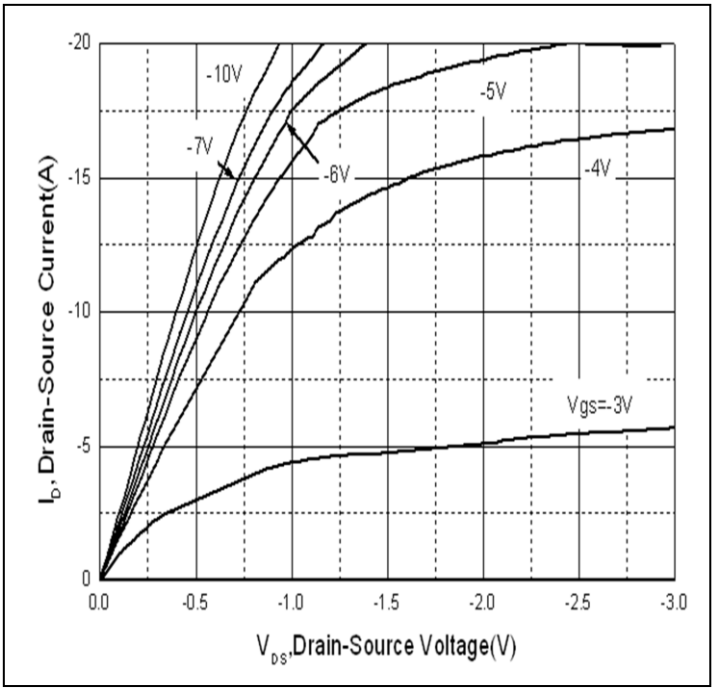



Figure1. Typical Output Characteristics

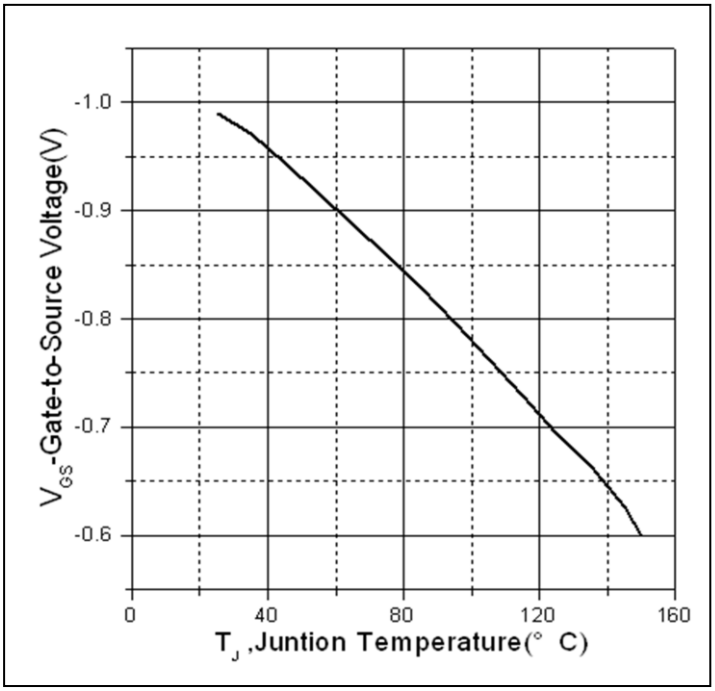



Figure2. Gate to Source Cut-off Voltage

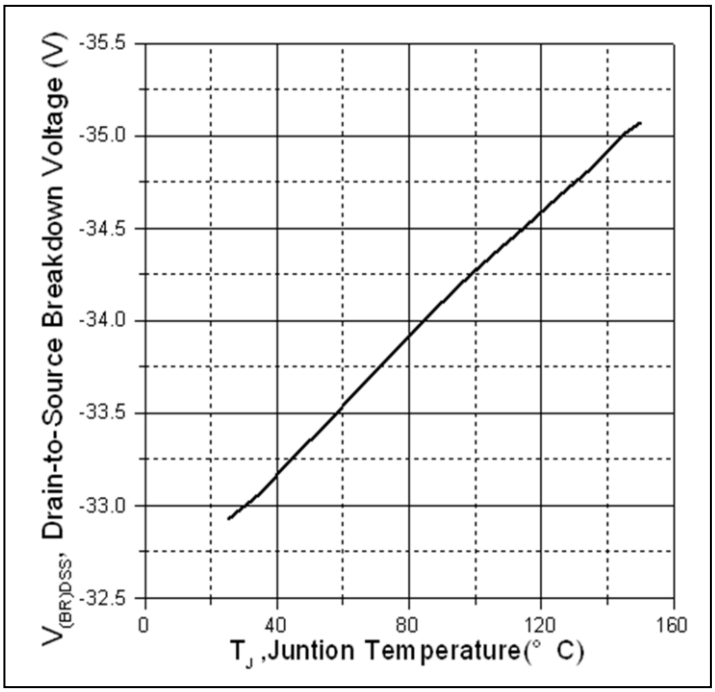



Figure3. Drain-to-Source Breakdown Voltage vs. Junction Temperature

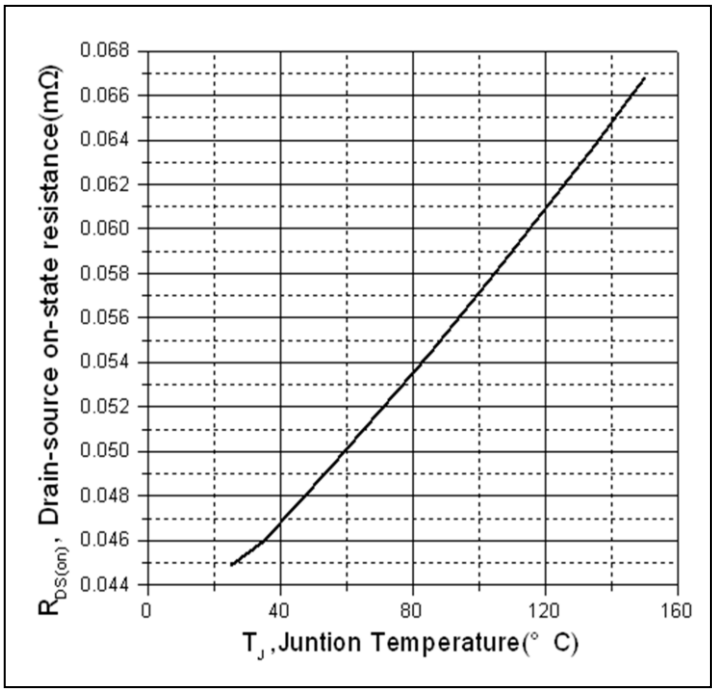



Figure4. Normalized On-Resistance vs. Junction Temperature

## Typical Electrical and Thermal Characteristics

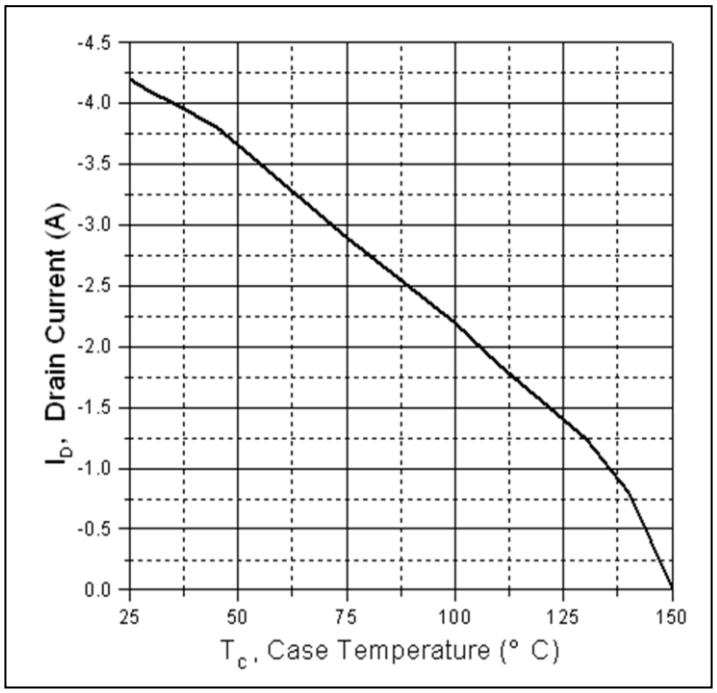



Figure5. Maximum Drain Current vs. Case Temperature

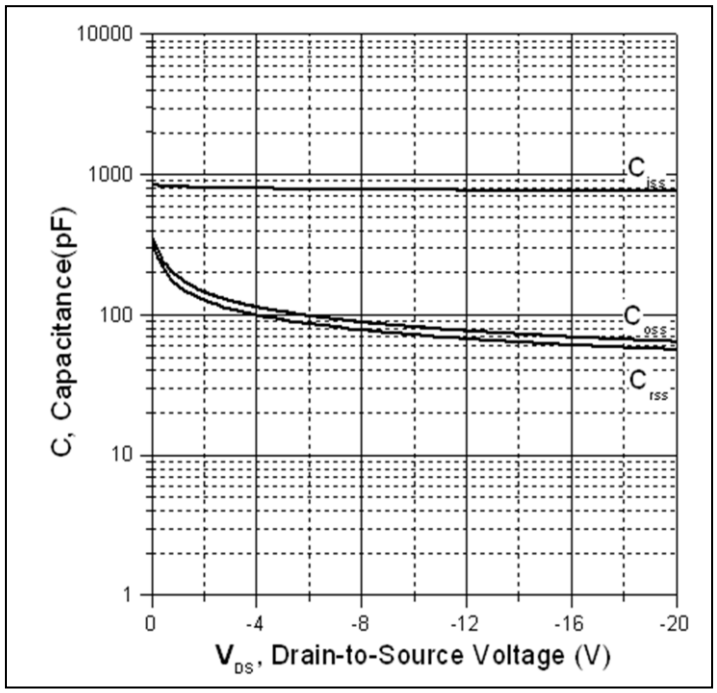



Figure6. Typical Capacitance vs. Drain-to-Source Voltage

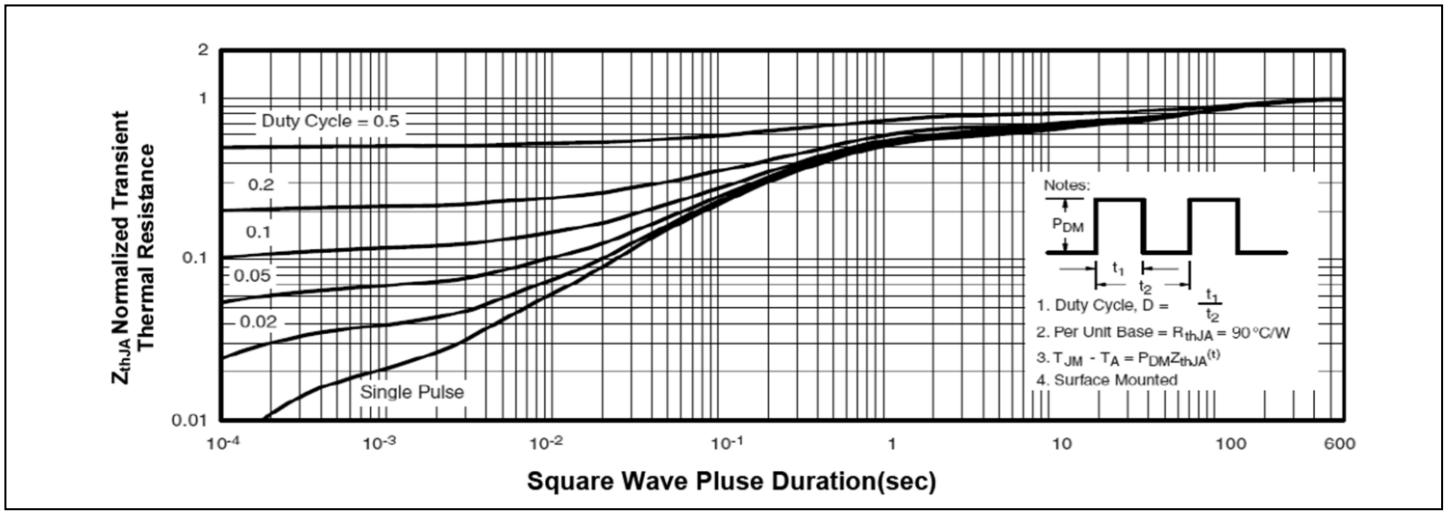
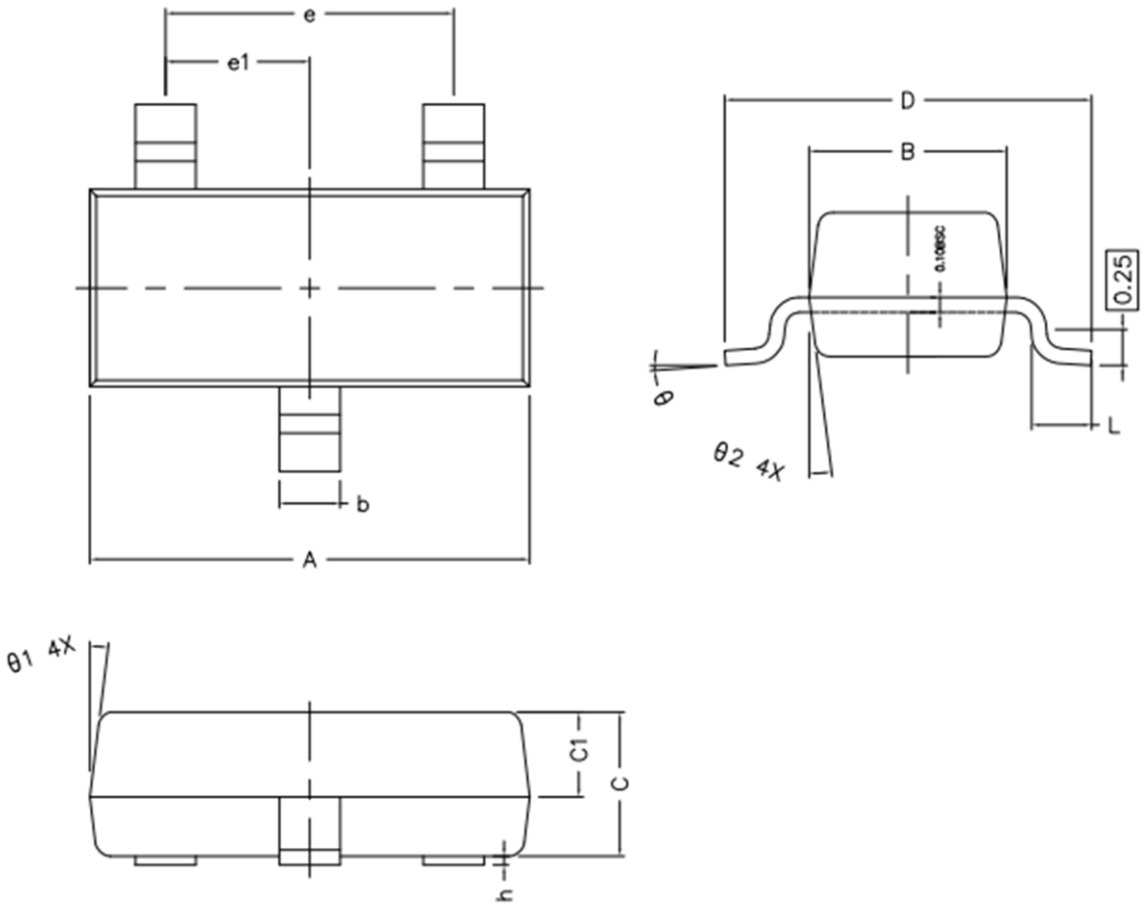



Figure7. Maximum Effective Transient Thermal Impedance Junction-to-Case

## Mechanical Data：

**SOT-23 Package Outline(Unit:mm)**




| COMMON DIMENSIONS (UNITS OF MEASURE IS mm) | | | |
|---|---|---|---|
| | MIN | NORMAL | MAX |
| A | 2.800 | 2.900 | 3.000 |
| B | 1.200 | 1.300 | 1.400 |
| C | 0.900 | 1.000 | 1.100 |
| C1 | 0.500 | 0.550 | 0.600 |
| D | 2.300 | 2.400 | 2.500 |
| L | 0.300 | 0.400 | 0.500 |
| h | 0.010 | 0.050 | 0.100 |
| b | 0.350 | 0.400 | 0.450 |
| e | 1.90 TYPE | | |
| e1 | 0.95 TYPE | | |
| $\theta_1$ | 7° TYPE | | |
| $\theta_2$ | 7° TYPE | | |
| θ | 0° ~ 7° | | |

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