

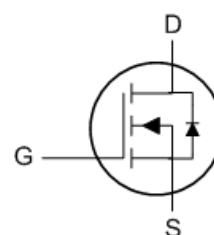
## N-Ch 30V Fast Switching MOSFETs

### Features:

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent  $CdV/dt$  effect decline
- ★ Advanced high cell density Trench technology



TO252 Pin Configuration



### Description :

The KJD3006 is the high cell density trench N-ch MOSFETs, which provide excellent  $R_{DS(on)}$  and gate charge for most of the synchronous buck converter applications.

The KJD3006 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### Product Summary

| BVDSS | $R_{DS(on)}$  | $I_D$ |
|-------|---------------|-------|
| 30V   | 5.5m $\Omega$ | 80A   |

### Absolute Maximum Ratings

| Symbol                | Parameter                                             | Rating     |              | Units      |
|-----------------------|-------------------------------------------------------|------------|--------------|------------|
|                       |                                                       | 10s        | Steady State |            |
| $V_{DS}$              | Drain-Source Voltage                                  | 30         |              | V          |
| $V_{GS}$              | Gate-Source Voltage                                   | $\pm 20$   |              | V          |
| $I_D@T_C=25^\circ C$  | Continuous Drain Current, $V_{GS}$ @ 10V <sup>1</sup> | 80         |              | 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 |              | $^\circ C$ |
| $T_J$                 | Operating Junction Temperature Range                  | -55 to 175 |              | $^\circ C$ |

### Thermal Data

| Symbol          | Parameter                                                        | Typ. | Max. | Unit         |
|-----------------|------------------------------------------------------------------|------|------|--------------|
| $R_{\theta JA}$ | Thermal Resistance Junction-ambient (Steady State) <sup>1</sup>  | ---  | 62   | $^\circ C/W$ |
| $R_{\theta JA}$ | Thermal Resistance Junction-Ambient <sup>1</sup> (t $\leq 10$ s) | ---  | 25   | $^\circ C/W$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-Case <sup>1</sup>                    | ---  | 2.8  | $^\circ C/W$ |

**Electrical Characteristics ( $T_J=25\text{ }^{\circ}\text{C}$ , unless otherwise noted)**

| Symbol                       | Parameter                                      | Conditions                                           | Min. | Typ.  | Max.      | Unit                   |
|------------------------------|------------------------------------------------|------------------------------------------------------|------|-------|-----------|------------------------|
| $BV_{DSS}$                   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                            | 30   | ---   | ---       | V                      |
| $\Delta BV_{DSS}/\Delta T_J$ | BVDSS Temperature Coefficient                  | Reference to $25^{\circ}\text{C}$ , $I_D=1\text{mA}$ | ---  | 0.028 | ---       | V/ $^{\circ}\text{C}$  |
| $R_{DS(ON)}$                 | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=10V, I_D=30A$                                | ---  | 4.7   | 5.5       | $\text{m}\Omega$       |
|                              |                                                | $V_{GS}=4.5V, I_D=15A$                               | ---  | 7.5   | 9         |                        |
| $V_{GS(th)}$                 | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                        | 1.0  | 1.5   | 2.5       | V                      |
| $\Delta V_{GS(th)}$          | $V_{GS(th)}$ Temperature Coefficient           |                                                      | ---  | -6.16 | ---       | mV/ $^{\circ}\text{C}$ |
| $I_{DSS}$                    | Drain-Source Leakage Current                   | $V_{DS}=24V, V_{GS}=0V, T_J=25^{\circ}\text{C}$      | ---  | ---   | 1         | $\mu A$                |
|                              |                                                | $V_{DS}=24V, V_{GS}=0V, T_J=55^{\circ}\text{C}$      | ---  | ---   | 5         |                        |
| $I_{GSS}$                    | Gate-Source Leakage Current                    | $V_{GS}=\pm 20V, V_{DS}=0V$                          | ---  | ---   | $\pm 100$ | nA                     |
| $g_{fs}$                     | Forward Transconductance                       | $V_{DS}=5V, I_D=30A$                                 | ---  | 22    | ---       | S                      |
| $R_g$                        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$                | ---  | 1.7   | 3.4       | $\Omega$               |
| $Q_g$                        | Total Gate Charge (4.5V)                       | $V_{DS}=15V, V_{GS}=4.5V, I_D=15A$                   | ---  | 20    | ---       | nC                     |
| $Q_{gs}$                     | Gate-Source Charge                             |                                                      | ---  | 7.6   | ---       |                        |
| $Q_{gd}$                     | Gate-Drain Charge                              |                                                      | ---  | 7.2   | ---       |                        |
| $T_{d(on)}$                  | Turn-On Delay Time                             | $V_{DD}=15V, V_{GS}=10V, R_G=3.3\Omega, I_D=15A$     | ---  | 7.8   | ---       | ns                     |
| $T_r$                        | Rise Time                                      |                                                      | ---  | 15    | ---       |                        |
| $T_{d(off)}$                 | Turn-Off Delay Time                            |                                                      | ---  | 37.3  | ---       |                        |
| $T_f$                        | Fall Time                                      |                                                      | ---  | 10.6  | ---       |                        |
| $C_{iss}$                    | Input Capacitance                              | $V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$               | ---  | 2295  | ---       | pF                     |
| $C_{oss}$                    | Output Capacitance                             |                                                      | ---  | 267   | ---       |                        |
| $C_{rss}$                    | Reverse Transfer Capacitance                   |                                                      | ---  | 210   | ---       |                        |

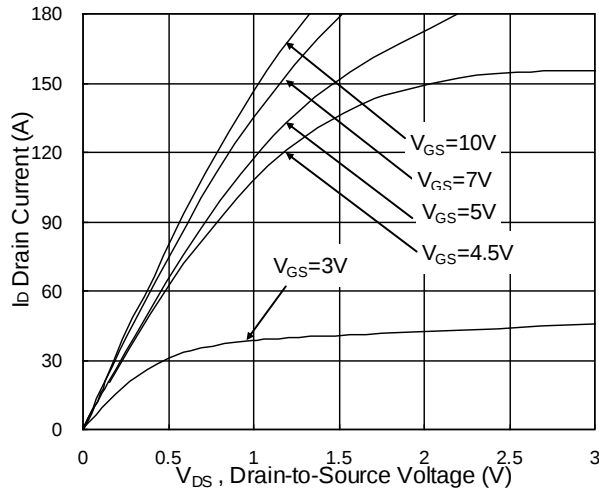
**Diode Characteristics**

| Symbol   | Parameter                                | Conditions                                          | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|-----------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                        | ---  | ---  | 80   | A    |
| $I_{SM}$ | Pulsed Source Current <sup>2,5</sup>     |                                                     | ---  | ---  | 160  | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=1A, T_J=25^{\circ}\text{C}$         | ---  | ---  | 1    | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=30A, dI/dt=100A/\mu s, T_J=25^{\circ}\text{C}$ | ---  | 14   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                     | ---  | 5    | ---  | nC   |

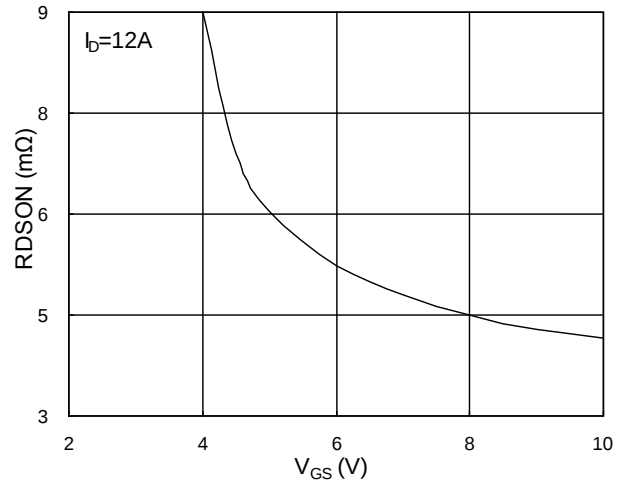
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1\text{mH}, I_{AS}=53.8A$
- 4.The power dissipation is limited by  $175^{\circ}\text{C}$  junction temperature
- 5.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.

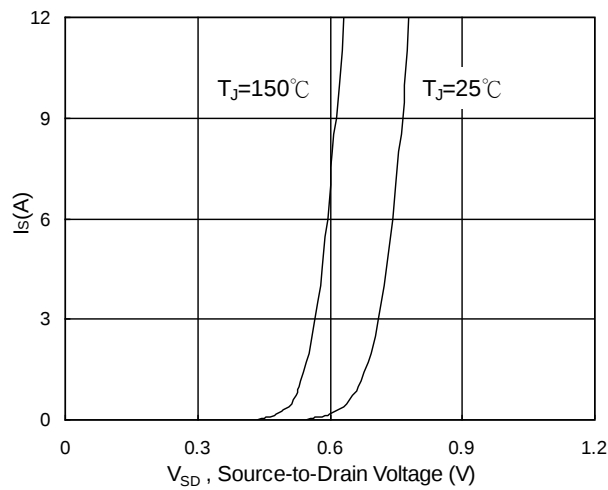
### Typical Characteristics



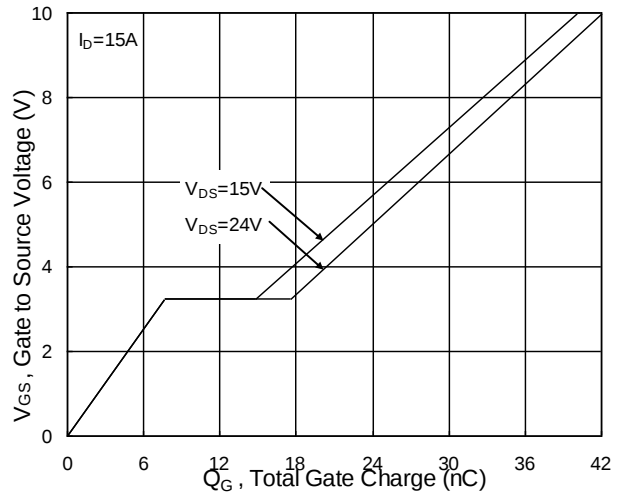
**Fig.1 Typical Output Characteristics**



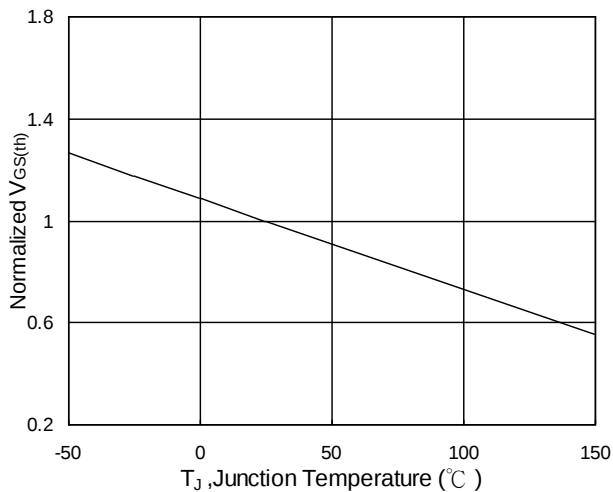
**Fig.2 On-Resistance vs. G-S Voltage**



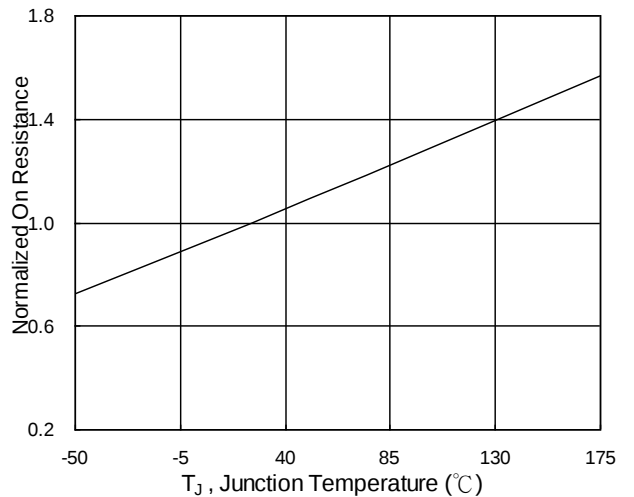
**Fig.3 Forward Characteristics of Reverse**



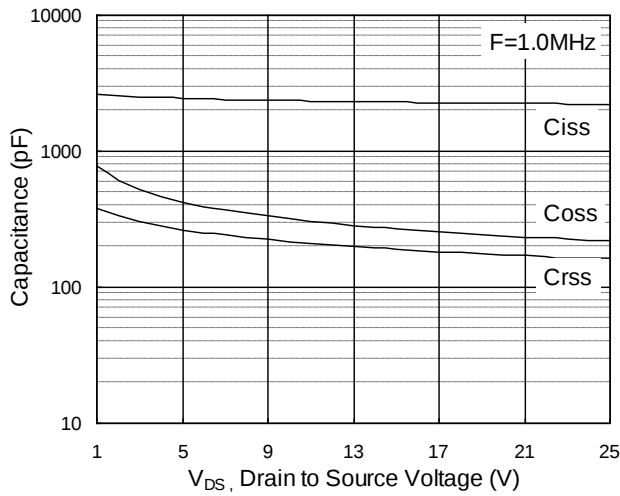
**Fig.4 Gate-Charge Characteristics**



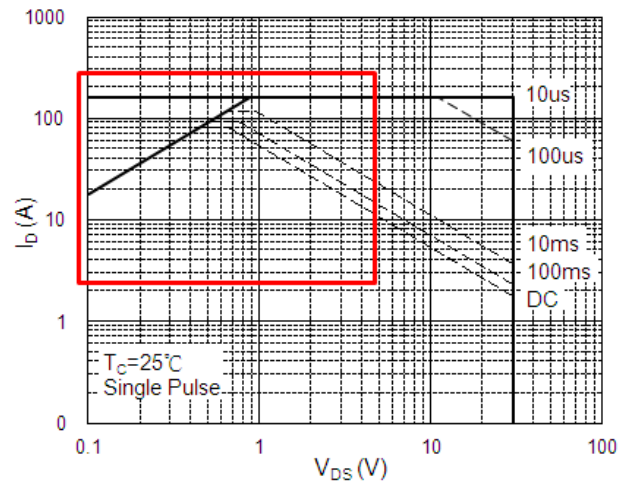
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



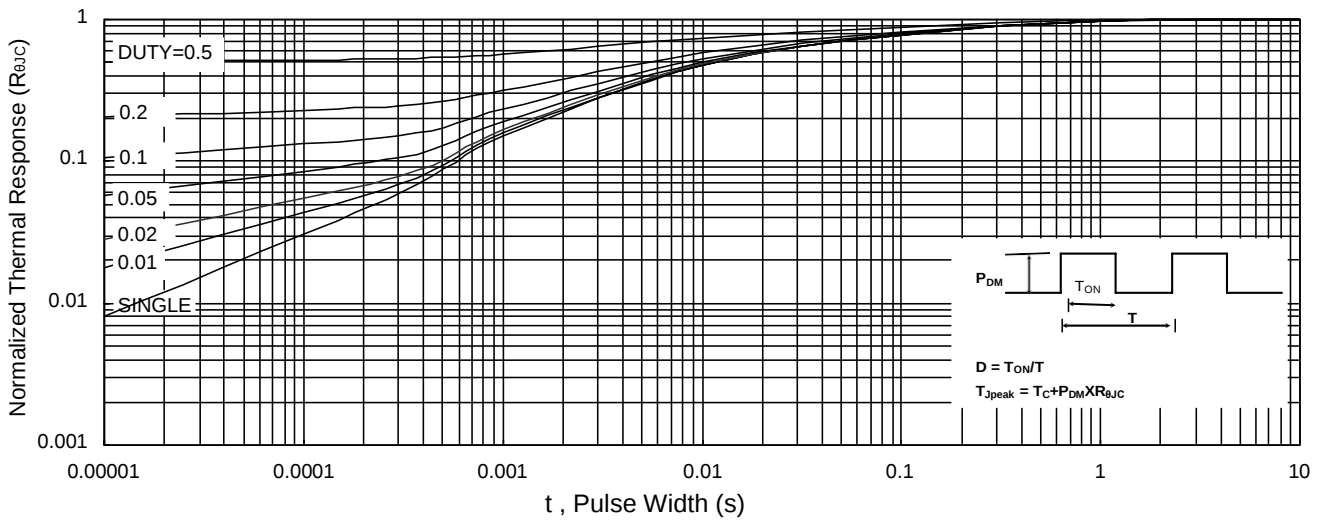
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



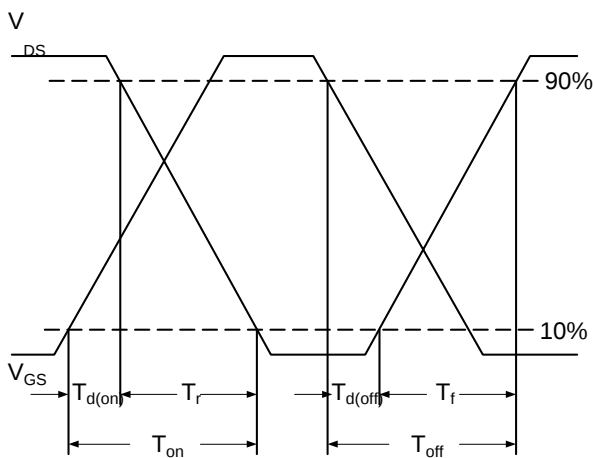
**Fig.7 Capacitance**



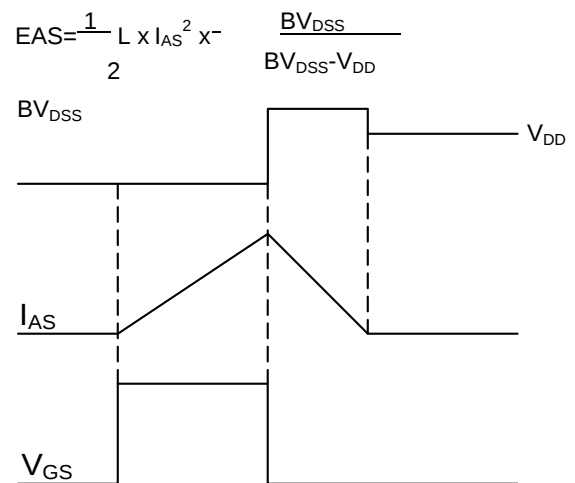
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

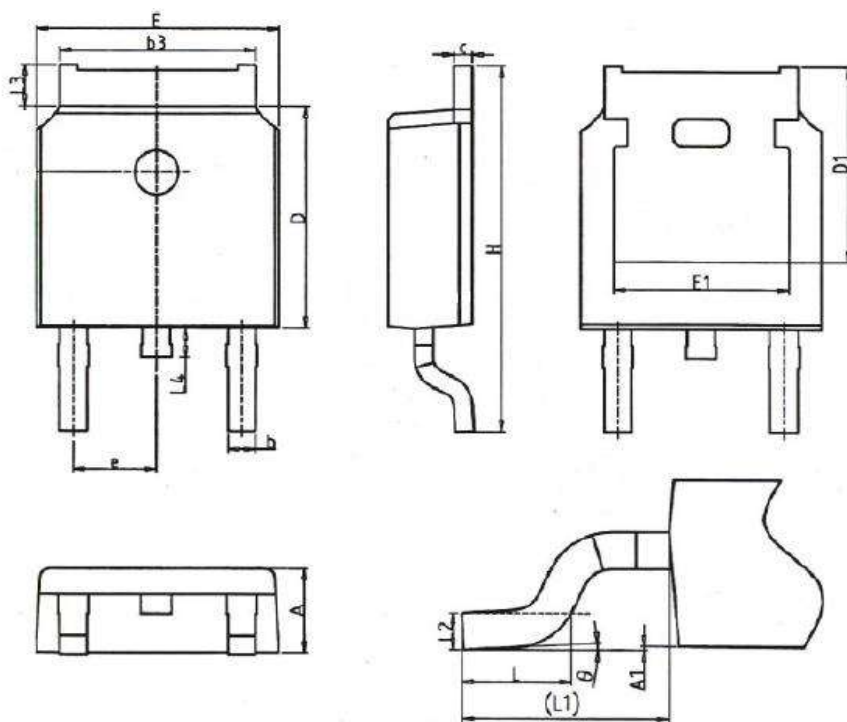


**Fig.10 Switching Time Waveform**

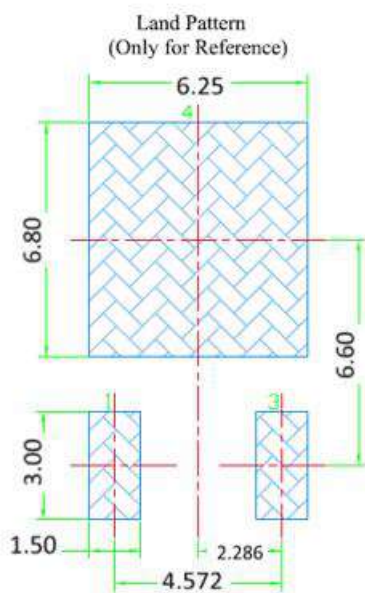


**Fig.11 Unclamped Inductive Switching Waveform**

## TO252 Package Outline



| SYMBOLS | MILLIMETERS |      | INCHES   |       |
|---------|-------------|------|----------|-------|
|         | MIN         | MAX  | MIN      | MAX   |
| A       | 2.18        | 2.40 | 0.086    | 0.095 |
| A1      | -           | 0.2  | -        | 0.008 |
| b       | 0.68        | 0.9  | 0.026    | 0.036 |
| b3      | 4.95        | 5.46 | 0.194    | 0.215 |
| c       | 0.43        | 0.89 | 0.017    | 0.035 |
| D       | 5.97        | 6.22 | 0.235    | 0.245 |
| D1      | 5.300REF    |      | 0.209REF |       |
| E       | 6.35        | 6.73 | 0.250    | 0.265 |
| E1      | 4.32        | --   | 0.170    | -     |
| e       | 2.286BSC    |      | 0.09BSC  |       |
| H       | 9.4         | 10.5 | 0.370    | 0.413 |
| L       | 1.38        | 1.78 | 0.054    | 0.070 |
| L1      | 2.90REF     |      | 0.114REF |       |
| L2      | 0.51BSC     |      | 0.020BSC |       |
| L3      | 0.88        | 1.28 | 0.034    | 0.050 |
| L4      | 0.5         | 1    | 0.019    | 0.039 |
| Θ       | 0°          | 8°   | 0°       | 8°    |



UNIT: mm