



TO-247-3

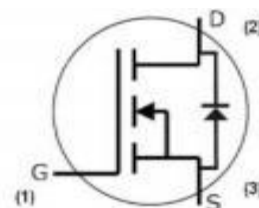
| | | | |
|----------------|---|------|----|
| VDS | = | 1200 | V |
| RDS(on)_typ | = | 80 | mΩ |
| I _D | = | 36 | A |

Features

- High Blocking Voltage with Low On-Resistance
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes

Applications

- Solar Inverters
- Switch Mode Power Supplies
- High Voltage DC-DC Converters
- Battery Chargers



Package Parameters

| Part Number | Marking | Package |
|-------------|-------------|----------|
| YX120R080T2 | YX120R080T2 | TO-247-3 |

Absolute Maximum Rating

| | | | | |
|----------------|--|--|---------------|------------------|
| E_{AS} | Avalanche energy | single pulse (L=10mH) | 720 | mJ |
| V_{GS} | Gate-Source voltage | | -5/+20 | V |
| P_{tot} | Power dissipation | $T_C = 25^\circ\text{C}$ | 214 | W |
| T_j, T_{stg} | Operating junction and storage temperature | | -55 to +175 | $^\circ\text{C}$ |
| Symbol | Parameter | Test Conditions | Values | Unit |
| V_{DS} | Drain-source voltage | | 1200 | V |
| I_D | Continuous drain current | $T_C = 25^\circ\text{C}$ | 36 | A |
| | | $T_C = 100^\circ\text{C}$ | 24 | A |
| $I_{D\ pulse}$ | Pulsed drain current | $T_C = 25^\circ\text{C}$, t_p limited by $T_{j\max}$ | 80 | A |

Thermal Resistance

| Parameter | Symbol | Value | Unit |
|---|------------|-------|---------------------------|
| Thermal resistance, junction – case. Max | R_{thJC} | 0.70 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction – ambient. Max | R_{thJA} | 40 | |

Electric Characteristics (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------------------|--|------|------|------|-----------|
| BV_{DSS} | Drain- source breakdown voltage | $V_{GS}=0V, I_D=250\mu A$ | 1200 | - | - | V |
| $V_{GS(th)}$ | Gate threshold voltage | $V_{DS}=V_{GS}, I_D=5\text{mA}$ | 2 | 3.2 | | V |
| I_{DSS} | Zero gate voltage drain current | $V_{DS}=1200V, V_{GS}=0V$ $T_C=25^\circ\text{C}$ | - | 1 | 100 | μA |
| | | $V_{DS}=1200V, V_{GS}=0V$ $T_C=175^\circ\text{C}$ | - | 5 | - | μA |
| I_{GSS} | Gate- source leakage current | $V_{GS}=20V, V_{DS}=0V$ | - | - | 200 | nA |
| $R_{DS(on)}$ | Drain- source on- state resistance | $V_{GS}=20V, I_D=10A$ $T_J=25^\circ\text{C}$ | - | 80 | 100 | $m\Omega$ |
| | | $V_{GS}=20V, I_D=10A$ $T_J=175^\circ\text{C}$ | - | 130 | - | $m\Omega$ |
| g_{fs} | Transconductance | $V_{DS}=20V, I_D=20A$ | - | 12 | - | S |

Dynamic Characteristic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------|------------------------------|---|------|------|------|----------|
| C_{iss} | Input Capacitance | $V_{DS} = 800V$ $V_{GS} = 0V$ $f = 1MHz$ | - | 1272 | - | pF |
| C_{oss} | Output Capacitance | | - | 75 | - | |
| C_{rss} | Reverse Transfer Capacitance | | - | 10 | - | |
| Q_G | Gate Total Charge | $V_{DS} = 800V$ $V_{GS} = -5/20V$ $I_D = 20A$ | - | 79 | - | nC |
| Q_{gs} | Gate-Source charge | | - | 17 | - | |
| Q_{gd} | Gate-Drain charge | | - | 43 | - | |
| E_{ON} | Turn-On Switching Energy | | - | 458 | - | μJ |
| E_{OFF} | Turn-Off Switching Energy | | - | 348 | - | |
| $t_{d(on)}$ | Turn-on delay time | $T_J = 25^\circ C,$ $V_{GS} = -5/20V,$ $I_D = 20A, V_{DS} = 800V,$ $R_g = 15\Omega,$ inductive load | - | 19 | - | ns |
| t_r | Rise time | | - | 74 | - | |
| $t_{d(off)}$ | Turn-off delay time | | - | 29 | - | |
| t_f | Fall time | | - | 22 | - | |
| R_G | Gate resistance | $V_{GS} = 0V, V_{DS} = 0V,$ $f = 1MHz$ | - | 1.7 | - | Ω |

Body Diode Characteristic

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|----------|------------------------------------|--|------|------|------|---------|
| V_{SD} | Body Diode Forward Voltage | $V_{GS} = -5V, I_{SD} = 10A,$ $T_J = 25^\circ C$ | | 4.2 | | V |
| | | $V_{GS} = -5V, I_{SD} = 10A,$ $T_J = 175^\circ C$ | | 3.7 | | |
| t_{rr} | Body Diode Reverse Recovery Time | $V_{GS} = -5V, I_{SD} = 20A$ $dI/dt = 2000A/us,$ $V_{DS} = 800V$ | | 24 | | nS |
| Q_{rr} | Body Diode Reverse Recovery Charge | | | 152 | | μC |

Typical Performance Characteristics

Fig 1. Output Characteristic ($T_j = -55^\circ\text{C}$)

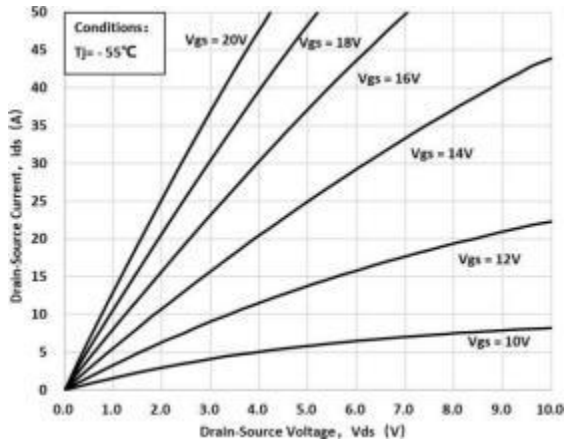


Fig 2. Output Characteristic ($T_j = 25^\circ\text{C}$)

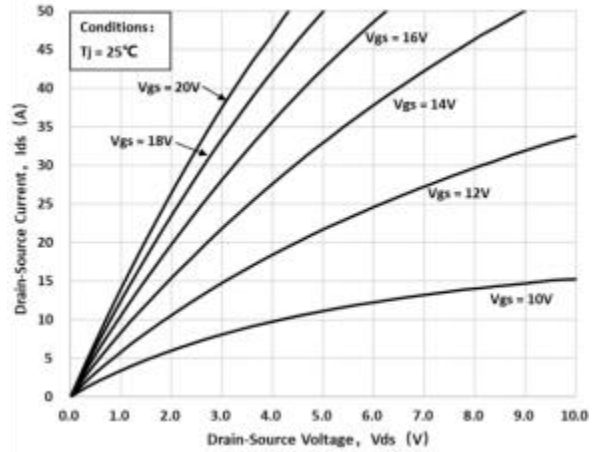


Fig 3. Output Characteristic ($T_j = 175^\circ\text{C}$)

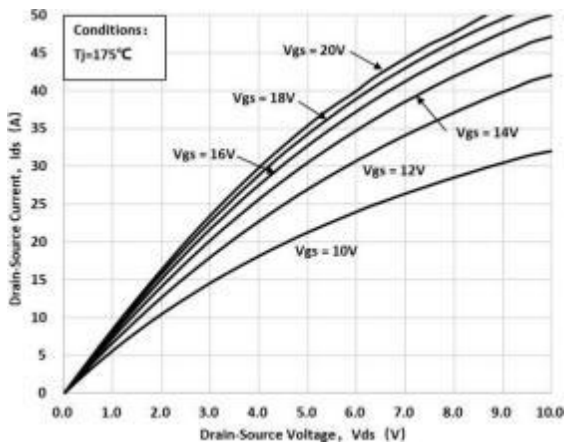


Fig 4: $R_{ds(on)}$ Vs I_{ds} Characteristic

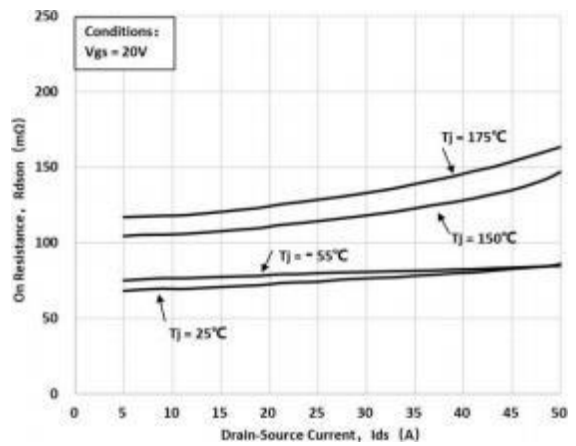


Fig 5: $R_{ds(on)}$ vs. Temperature

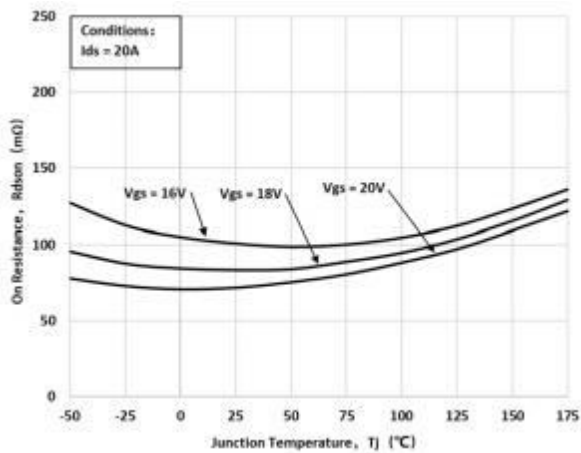


Fig 6: Transfer Characteristic

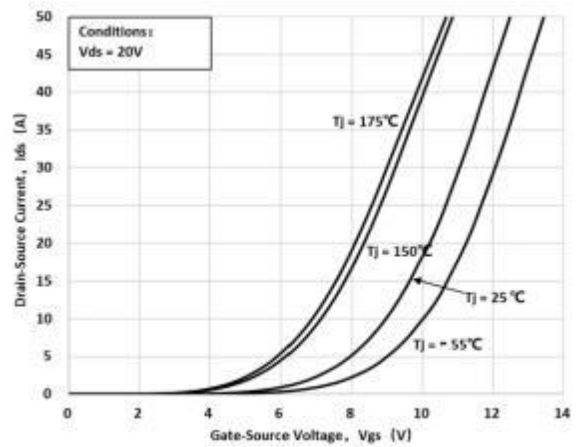


Fig 7: Body-diode Characteristic ($T_J = -55^\circ\text{C}$)

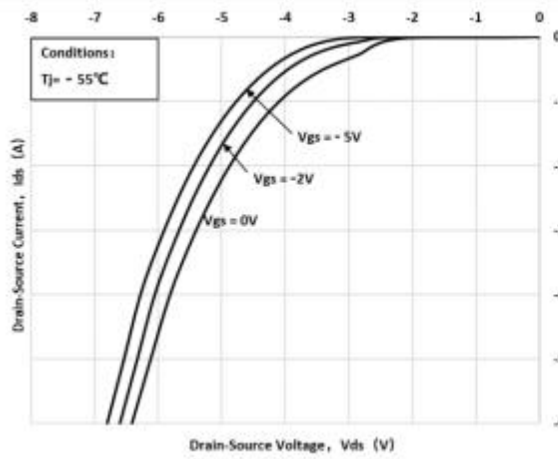


Fig 8: Body-diode Characteristic ($T_J = 25^\circ\text{C}$)

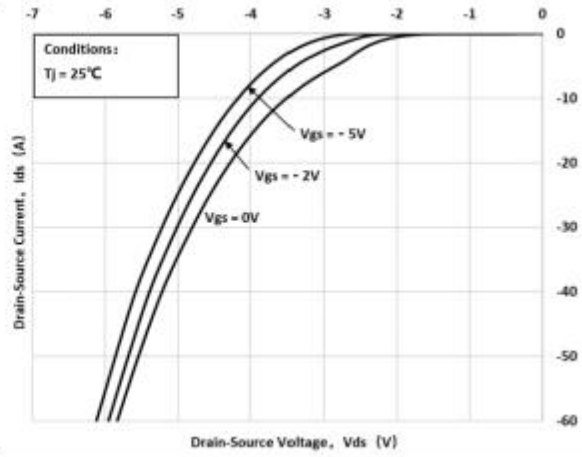


Fig 9: Body-diode Characteristic ($T_J = 175^\circ\text{C}$)

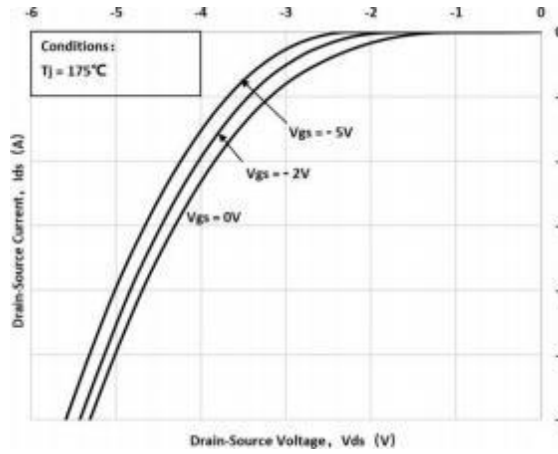


Fig 10: V_{TH} Vs T_J Temperature Characteristic

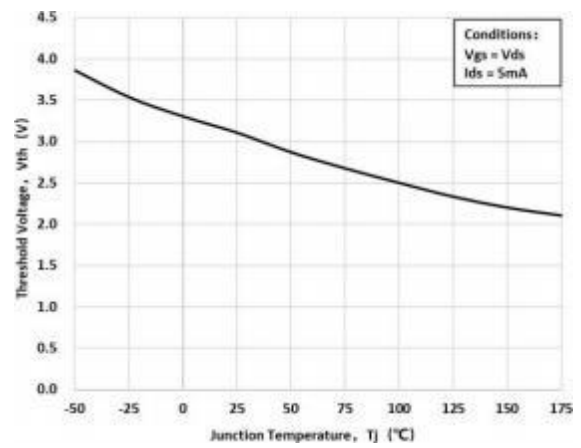


Fig 11: Gate Charge Characteristics

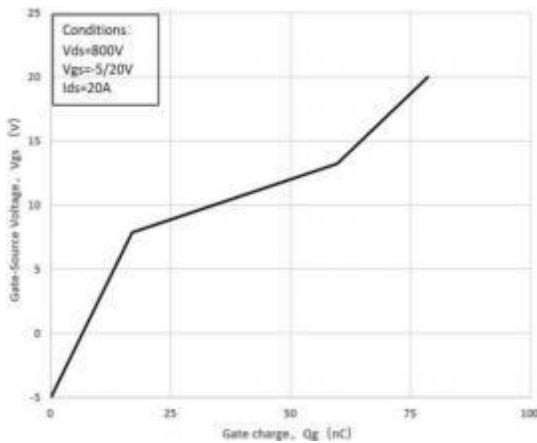


Fig 12: 3rd Quadrant Characteristic ($T_J = -55^\circ\text{C}$)

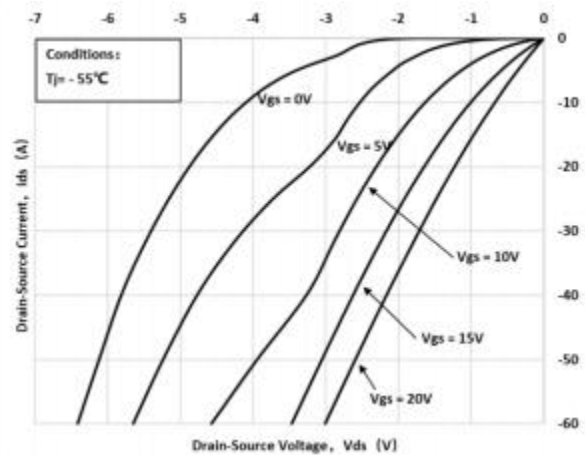


Fig 13: 3rd Quadrant Characteristic(TJ=25°C)

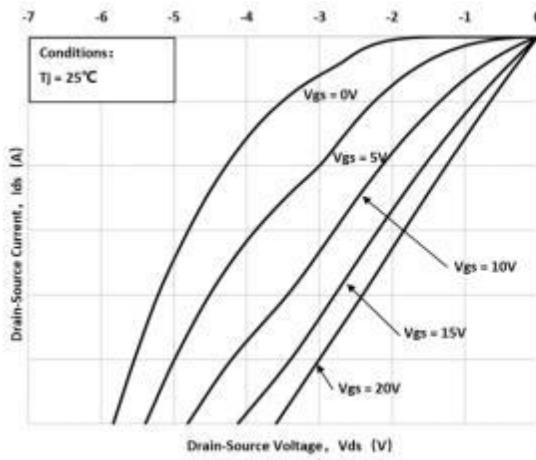


Fig 14: 3rd Quadrant Characteristic(TJ=175°C)

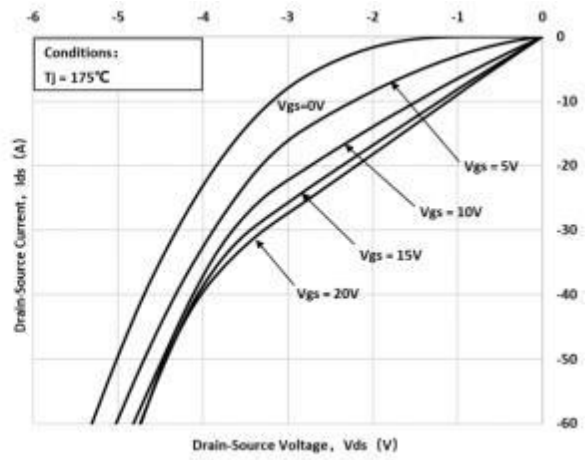


Fig 15: Capacitance Characteristic

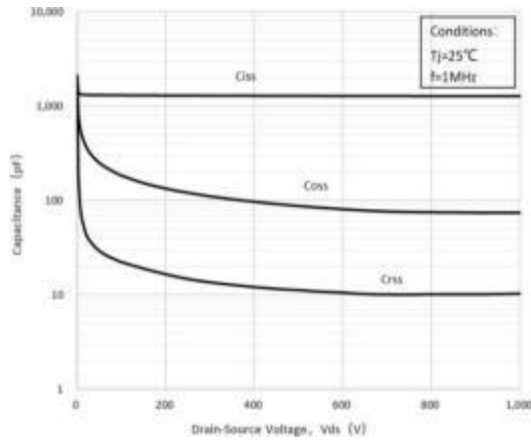


Fig 16: Safe Operating Area

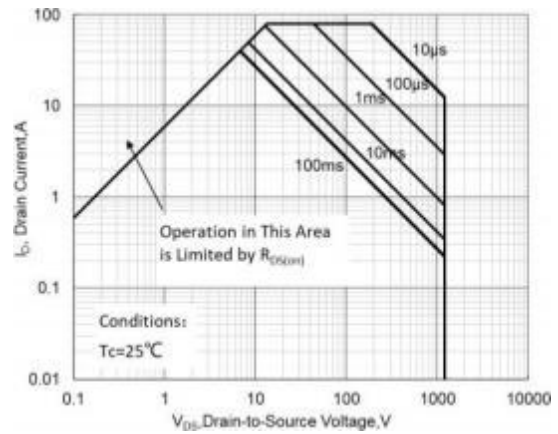
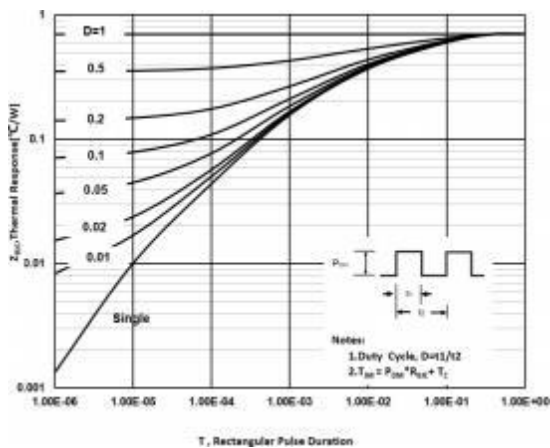
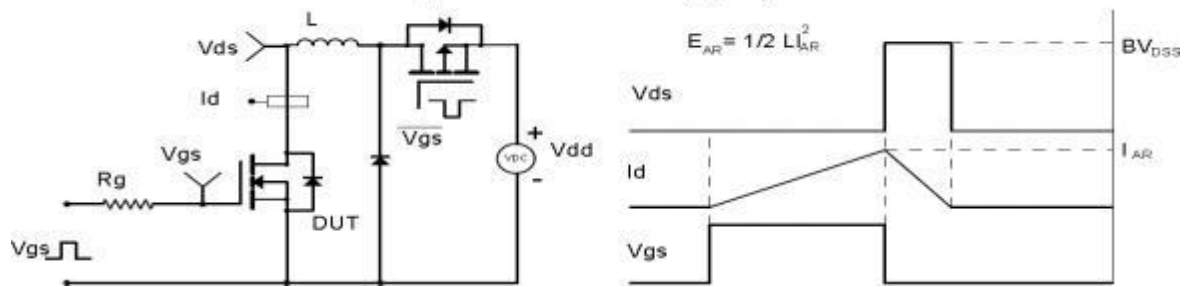


Fig 17: Transient Thermal Impedance

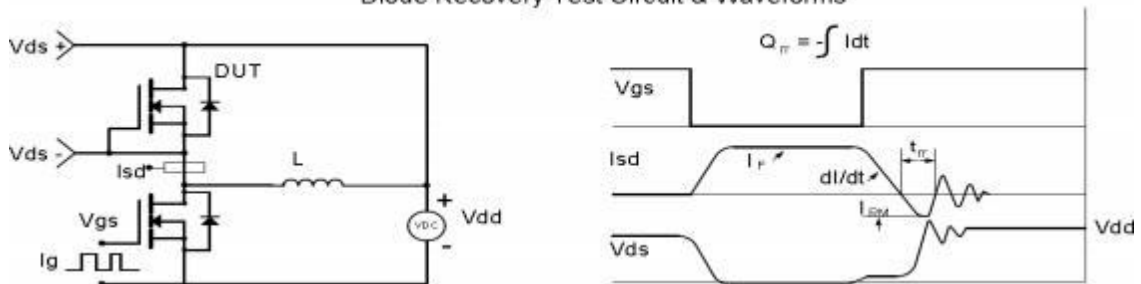


Test Circuit & Waveform

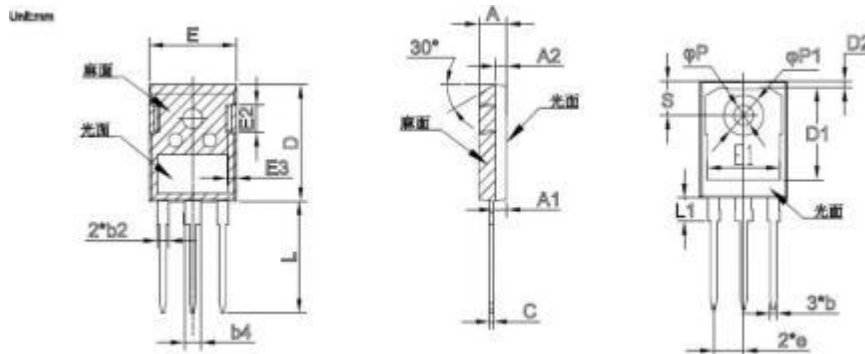
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline:



| TO247-3L | | | | | | | |
|----------|-------|-------|-------|----|-------|-------|-------|
| | Min | Nom | Max | | Min | Nom | Max |
| A | 4.70 | 5.00 | 5.20 | E1 | 13.06 | 13.26 | 13.56 |
| A1 | 2.30 | | 2.50 | E2 | 4.90 | 5.00 | 5.10 |
| A2 | 1.90 | 2.00 | 2.10 | E3 | 1.50 | 1.60 | 1.70 |
| b | 1.10 | 1.20 | 1.30 | e | 5.34 | 5.44 | 5.54 |
| b2 | | 2.00 | | L | 19.80 | 20.00 | 20.32 |
| b4 | | 3.00 | | L1 | | 4.17 | 4.50 |
| C | 0.5 | 0.6 | 0.7 | P | 3.50 | 3.60 | 3.70 |
| D | 20.8 | 20.95 | 21.1 | P1 | 7.00 | 7.19 | 7.40 |
| D1 | | 16.55 | | S | 6.04 | 6.15 | 6.3 |
| D2 | 0.95 | 1.17 | 1.35 | | | | |
| E | 15.48 | 15.88 | 16.28 | | | | |
| | | | | | | | |

Disclaimer

Unless otherwise specified in the datasheet, the product is designed and qualified as a standard commercial product and is not intended for use in applications that require extraordinary levels of quality and reliability, such as automotive, aviation/aerospace and life-support devices or systems.

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.