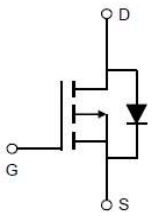
# AP90P06D

**P-Channel Enhancement Mosfet**

**DATA SHEET**

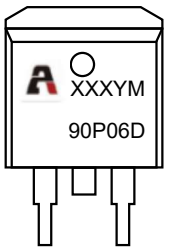
## Features




- -60V,-90A
  $R_{DS(ON)}$ <12mΩ @$V_{GS}$=-10V TYP:10mΩ
  $R_{DS(ON)}$ <15mΩ @$V_{GS}$=-4.5V TYP:12mΩ
- Surface-mounted package
- Low gate charge

## Applications

- Motor driver appliances
- DC-DC Converter
- High power inverter system




**TO-263**

## Package Marking and Ordering Information

| Device Marking | Device | Device Package | Reel Size | Tape width | Quantity (PCS) |
|---|---|---|---|---|---|
| 90P06D | AP90P06D | TO-263 | - | - | 800 |

## ABSOLUTE MAXIMUM RATINGS ($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Value | Unit |
|---|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | -60 | V |
| Gate-Source Voltage | $V_{GS}$ | ±20 | V |
| Continuous Drain Current (Tc=25℃) (2) | $I_D$ | -90 | A |
| Continuous Drain Current (Tc=100℃) (2) | $I_D$ | -58 | A |
| Pulsed Drain Current (1,2,3) | $I_{DM}$ | -120 | A |
| Drain Power Dissipation | $P_D$ | 156 | W |
| Thermal Resistance from Junction to Case(2) | $R_{\theta JC}$ | 0.8 | ℃/W |
| Thermal Resistance- Junction to Ambient(2) | $R_{\theta JA}$ | 62.5 | ℃/W |
| Junction Temperature | $T_J$ | 150 | ℃ |
| Storage Temperature | $T_{STG}$ | -55~ +150 | ℃ |

**Notes:**

1. Pulse width ≤ 300 μs, duty cycle ≤ 2 %
2. Surface Mounted on 1 in2 pad area, t ≤ 10 sec
3. Limited by bonding wire

## MOSFET ELECTRICAL CHARACTERISTICS($T_J$=25℃ unless otherwise noted)

| Parameter | Symbol | Test Condition | Min | Type | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $V_{(BR)DSS}$ | $V_{GS}$ = 0V, $I_D$ =-250μA | -60 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$ =-48V, $V_{GS}$ = 0V | - | - | -1 | μA |
| Gate-body leakage current | $I_{GSS}$ | $V_{GS}$ =±20V, $V_{DS}$ = 0V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$ =$V_{GS}$, $I_D$ =-250μA | -1 | - | -3 | V |
| Drain-source on-resistance[a] | $R_{DS(on)}$ | $V_{GS}$ =-10V, $I_D$ =-20A | - | 10 | 12 | mΩ |
| | | $V_{GS}$ =-4.5V, $I_D$ =-10A | | 12 | 15 | mΩ |
| **Dynamic characteristics** | | | | | | |
| Input Capacitance | $C_{iss}$ | $V_{DS}$ =-30V, $V_{GS}$ =0V, f =1.0MHz | - | 8038 | - | pF |
| Output Capacitance | $C_{oss}$ | | - | 335 | - | |
| Reverse Transfer Capacitance | $C_{rss}$ | | - | 144 | - | |
| **Switching characteristics** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | $V_{DD}$=-30V, $I_D$=-20A, $R_G$=4.5Ω, $R_L$=2Ω,$V_G$=-10V | - | 81 | - | ns |
| Turn-on rise time | $t_r$ | | - | 130 | - | |
| Turn-off delay time | $t_{d(off)}$ | | - | 685 | - | |
| Turn-off fall time | $t_f$ | | - | 255 | - | |
| Total Gate Charge | Qg | $V_{DS}$=-30V, $I_D$=-20A, $V_{GS}$=-10V | - | 121 | - | nC |
| Gate-Source Charge | Qgs | | - | 29 | - | |
| Gate-Drain Charge | Qgd | | - | 13 | - | |
| **Source-Drain Diode characteristics** | | | | | | |
| Diode Forward voltage[a] | $V_{SD}$ | $T_J$=25℃, $V_{GS}$ =0V, $I_S$=-20A | - | - | -1.3 | V |
| Diode Forward current | $I_S$ | $T_C$=25℃ | - | - | -90 | A |
| Body Diode Reverse Recovery Time | trr | $T_J$=25℃，IF=-20A,di/dt=100A/us | | 40 | | ns |
| Body Diode Reverse Recovery Charge | Qrr | $T_J$=25℃，IF=-20A,di/dt=100A/us | | 47 | | nc |

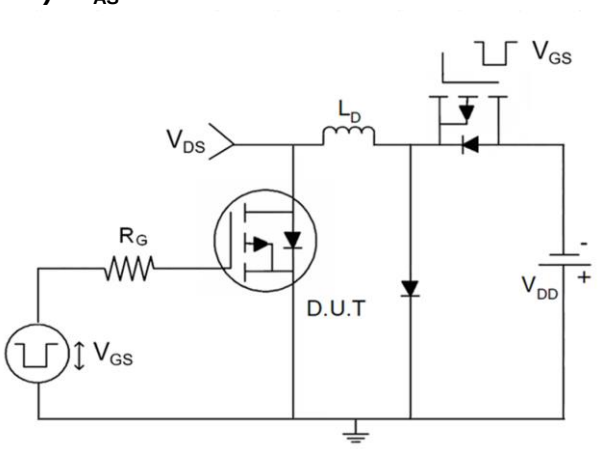
**Notes:**

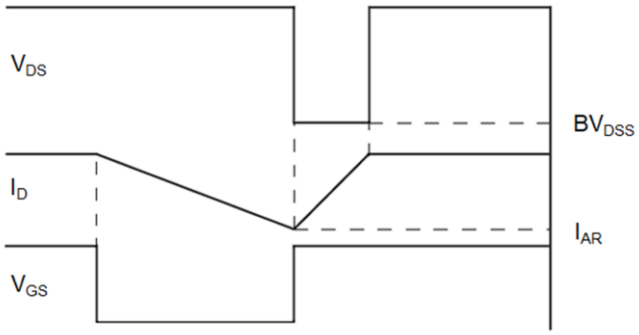
a) Pulse width ≤ 300 μs, duty cycle ≤ 2%

b) Guaranteed by design, not subject to production testing

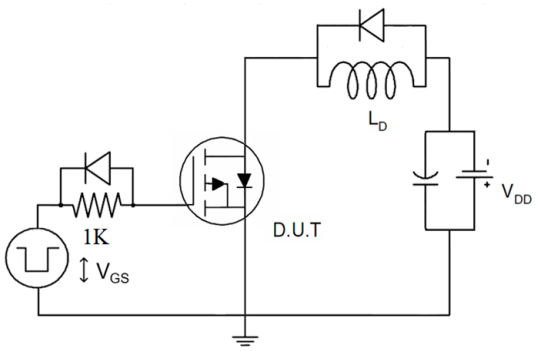
## Test Circuit

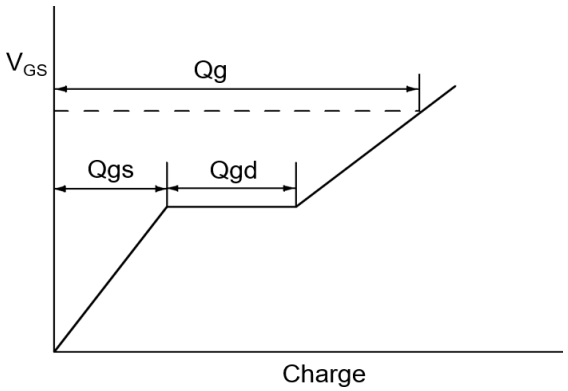
### 1) $E_{AS}$ Test Circuits



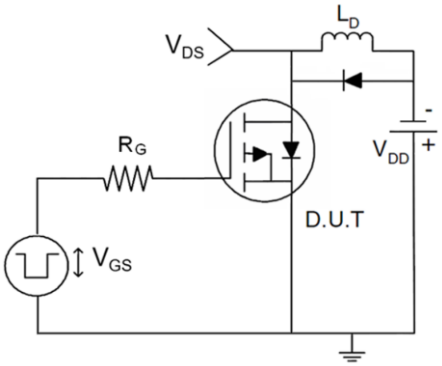



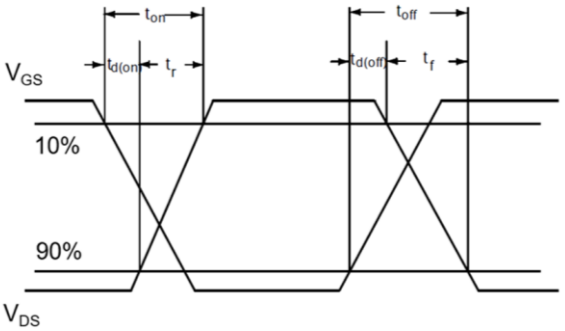

### 2) Gate Charge Test Circuit



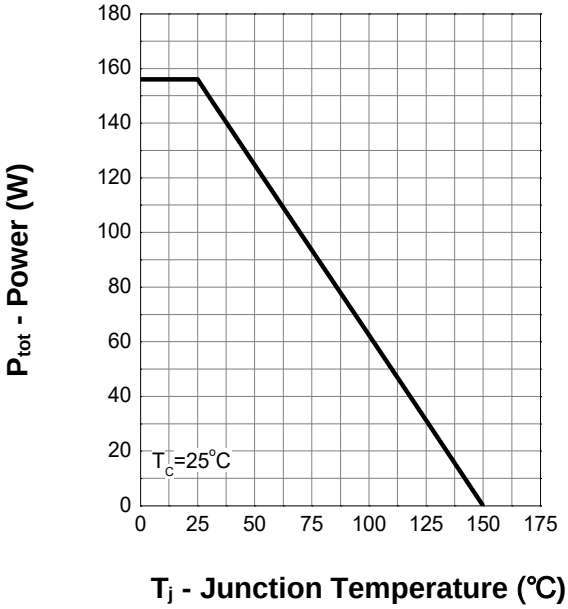

### 3) Switch Time Test Circuit



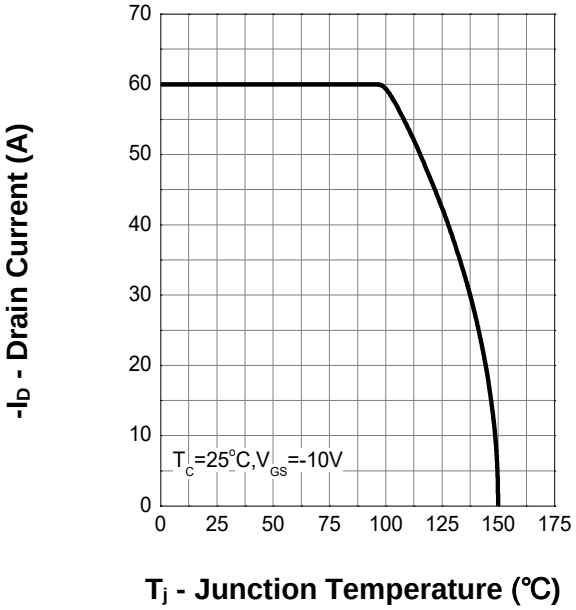



## Typical Characteristics (Cont.)

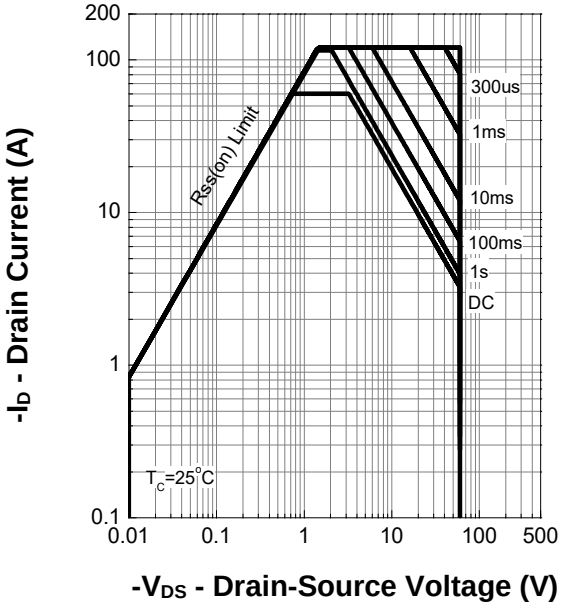
**Power Capability**



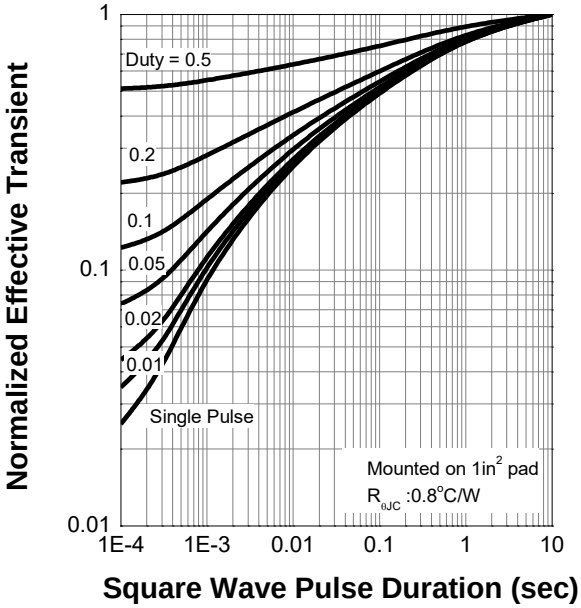

**Current Capability**




**Safe Operation Area**

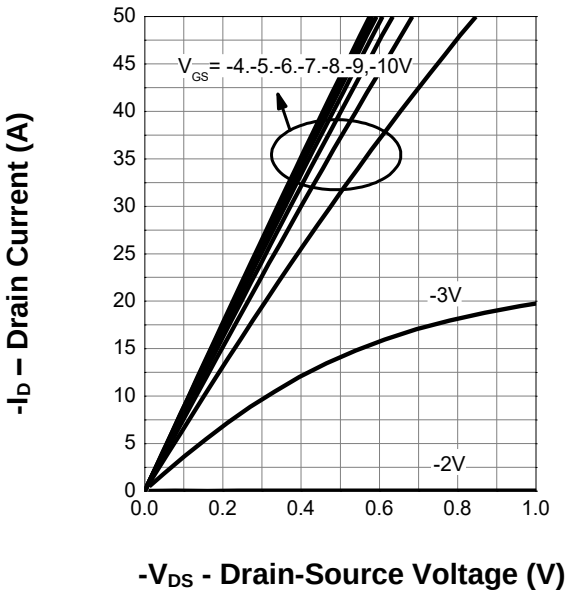



**Thermal Transient Impedance**

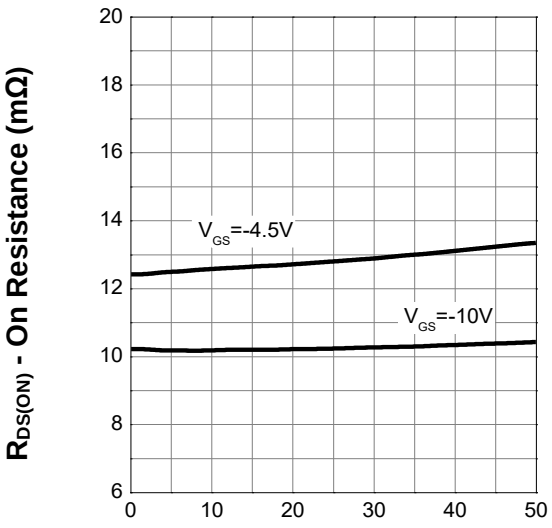


# Typical Characteristics (Cont.)

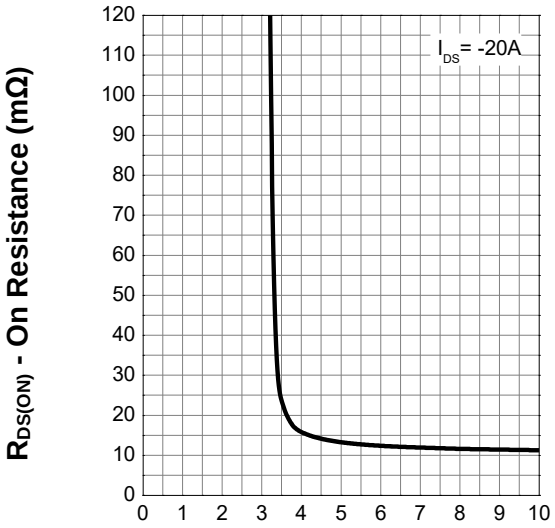
**Output Characteristics**



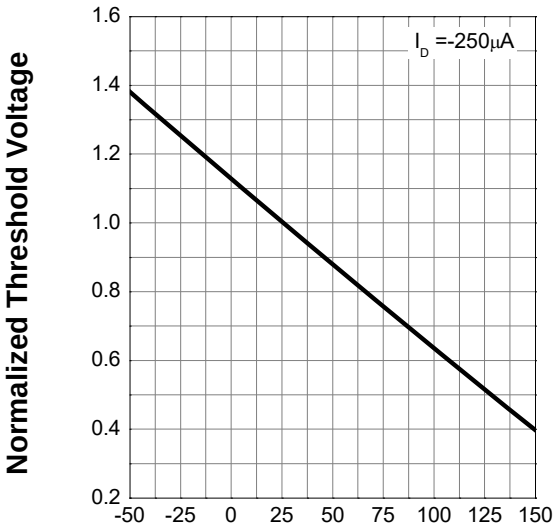

**Drain-Source On Resistance**




**Transfer Characteristics**

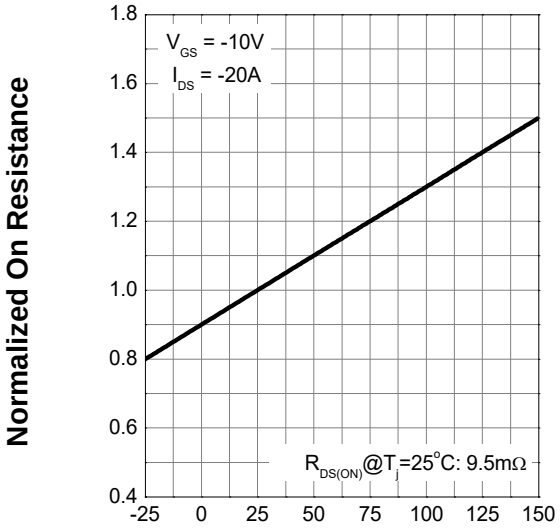



**Gate Threshold Voltage**

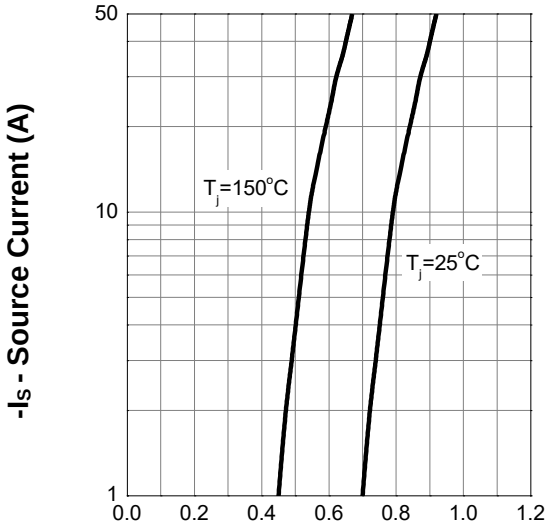


## Typical Characteristics (Cont.)

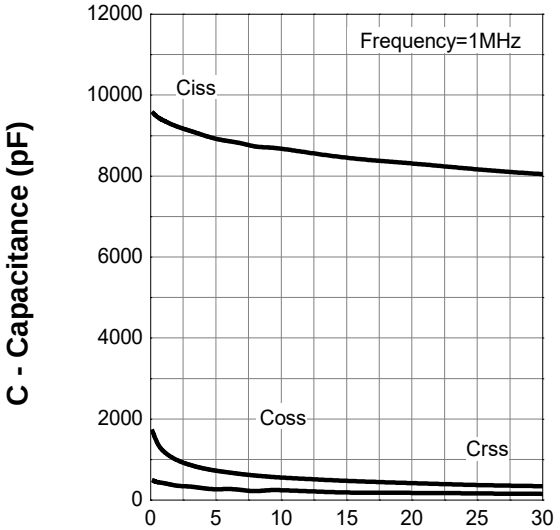
**Drain-Source On Resistance**



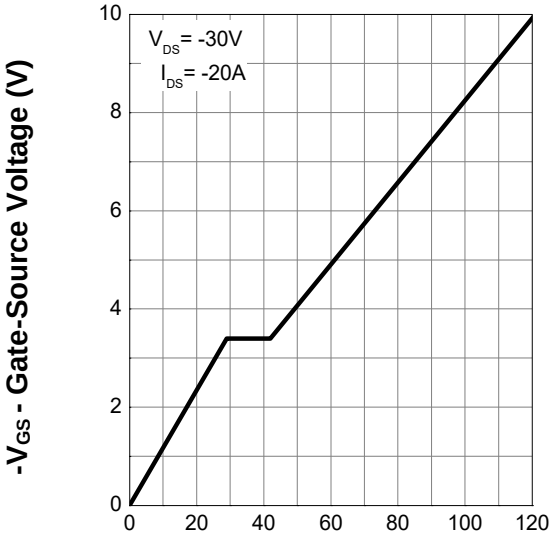

**Body Diode Characteristics**




**Capacitance**

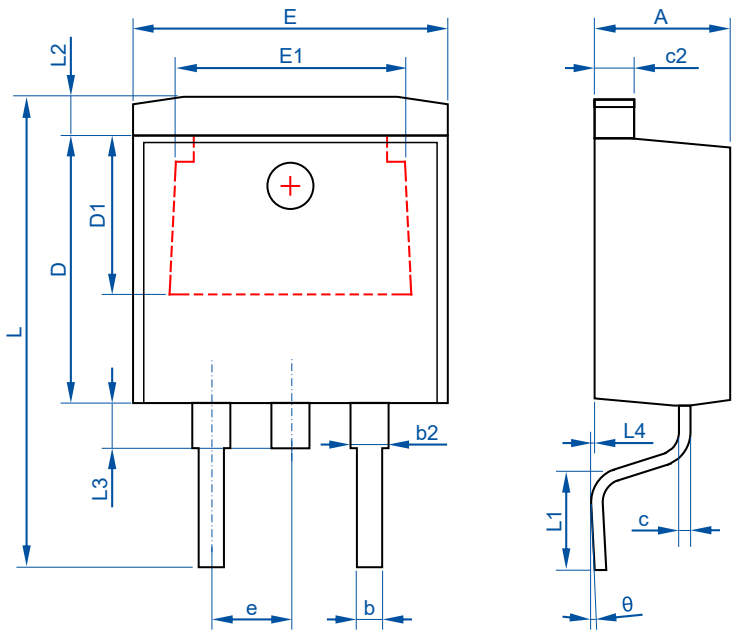



**Gate Charge**



# Package Dimensions

## TO-263




| Symbol | Dimensions In Millimeters | |
|---|---|---|
| | MIN. | MAX. |
| A | 4.40 | 4.80 |
| b | 0.76 | 1.00 |
| L4 | 0.00 | 0.25 |
| C | 0.36 | 0.50 |
| L3 | 1.50 REF | |
| L1 | 2.29 | 2.79 |
| E | 9.80 | 10.40 |
| E1 | 7.40 REF | |
| c2 | 1.25 | 1.45 |
| b2 | 1.17 | 1.47 |
| D | 8.60 | 9.00 |
| D1 | 5.10 REF | |
| e | 2.54 REF | |
| L | 14.60 | 15.80 |
| θ | 0° ± 3° | |
| L2 | 1.27 REF | |

## Revision History

| Revision | Release | Remark |
|---|---|---|
| V1.0 | 2023/03/21 | Initial Release |

## Disclaimer

**The information given in this document describes the independent performance of the product,but similar performance is not guaranteed under other working conditions,and cannot be guaranteed when installed with other products or equipment.To achieve the required performance of the product in actual scenarios,the customer should conduct a complete application test to assess the functionality of the product.**

**Allpower assumes no responsibility for equipment failures result from using products at values that exceed the ratings,operating conditions,or other parameters listed in the product specifications.**

**The product described in this specification is not applicable for aerospace or other applications which requires high reliability.Customers using or selling these products for use in medical,life-saving,or life-sustaining applications do so at their own risk and agree to fully indemnify.**

**Due to product or technical improvements,the information described or contained herein may be changed without prior notice.**