# 100V P-Channel Enhancement Mode MOSFET

## Description

The PECN30P10G uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

## General Features

◆ $V_{DS}$ =-100V   $I_D$ =-30A
$R_{DS(ON)}$(Typ.)=36mΩ   @$V_{GS}$=-10V
$R_{DS(ON)}$(Typ.)=40mΩ   @$V_{GS}$=-4.5V
High power and current handing capability

◆ Lead free product is acquired

◆ Surface mount package

## Application

◆ Load switch

## Package

◆ TO-252-2L

*100% UIS TESTED!*
*100% ΔVds TESTED!*

## Schematic diagram
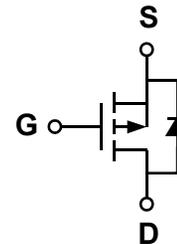


## Marking and pin assignment
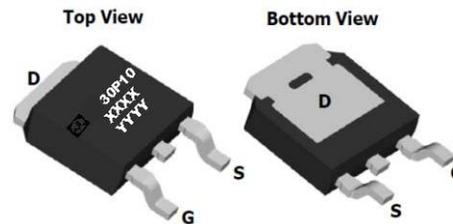


PECN30P10—NP30P10G

XXXX—Wafer Lot No.
YYYY—Quality Code

## Ordering Information

| Part Number | Storage Temperature | Package | Devices Per Reel |
|---|---|---|---|
| PECN30P10G-G | -55°C to +150°C | TO-252-2L | 2500 |

## Absolute Maximum Ratings (TA=25℃ unless otherwise noted)

| parameter | | symbol | limit | unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DS}$ | -100 | V |
| Gate-source voltage | | $V_{GS}$ | ±20 | V |
| Continuous Drain Current ($T_J$ = 150 °C)[b] | $T_C$=25°C | $I_D$ | -36 | A |
| | $T_C$=70°C | | -29 | |
| | $T_A$=25°C | | -9[b,c] | |
| | $T_A$=70°C | | -7.2[b,c] | |
| Pulsed Drain Current | | $I_{DM}$ | -40 | |
| Continuous Source Current (Diode Conduction) | $T_C$=25°C | $I_S$ | -50[a] | |
| | $T_A$=25°C | | -5.75[b,c] | |
| Avalanche Current | L = 0.1 mH | $I_{AS}$ | -35 | |
| Single Pulse Avalanche Energy | | $E_{AS}$ | 61 | mJ |

| Maximum power dissipation | $T_C$=25°C | $P_D$ | 113 | W |
|---|---|---|---|---|
| | $T_C$=70°C | | 72 | |
| | $T_A$=25°C | | 6.9[b,c] | |
| | $T_A$=70°C | | 4.4[b,c] | |
| Operating Junction and Storage Temperature Range | | $T_J,T_{STG}$ | -55—150 | ℃ |

## Thermal Characteristics

| Parameter | | Symbol | Typical | Maximum | Unit |
|---|---|---|---|---|---|
| Thermal Resistance-Junction to Case | | $R_{\theta JC}$ | 0.85 | 1.1 | ℃/W |
| Thermal Resistance junction-to ambient [a] | t≤10s | $R_{\theta JA}$ | 15 | 18 | |
| | Steady State | | 40 | 50 | |

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

c. t = 10 s.

d. Maximum under steady state conditions is 50 °C/W.

## Electrical Characteristics (TA=25℃ unless otherwise noted)

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **Static Characteristics** | | | | | | |
| Drain-source breakdown voltage | $BV_{DSS}$ | $V_{GS}$=0V, $I_D$=-250µA | -100 | - | - | V |
| Zero gate voltage drain current | $I_{DSS}$ | $V_{DS}$=-100V, $V_{GS}$=0V | - | - | -25 | µA |
| | | $V_{DS}$=-80V, $V_{GS}$=0V,$T_J$=150°C | - | - | -100 | |
| Gate Leakage Current | $I_{GSS}$ | $V_{DS}$=0V, $V_{GS}$=±20V | - | - | ±100 | nA |
| Gate threshold voltage | $V_{GS(th)}$ | $V_{DS}$=$V_{GS}$, $I_D$=-250µA | -1.0 | -1.9 | -3.0 | V |
| Drain-source on-state resistance[1] | $R_{DS(ON)}$ | $V_{GS}$=-10V, $I_D$=-30A | - | 36 | 43 | mΩ |
| | | $V_{GS}$=-4.5V, $I_D$=-10A | - | 40 | 48 | |
| Forward Transconductance | $G_{FS}$ | $V_{DS}$=-15V, $I_D$=-10A | - | 38 | - | S |
| **Diode Characteristics** | | | | | | |
| Diode Forward Voltage[1] | $V_{SD}$ | $I_{SD}$=-7.7A,$V_{GS}$=0V | - | -0.8 | -1.2 | V |
| Diode Continuous Forward Current | $I_S$ | $T_C$ = 25 °C | - | - | -50 | A |
| Reverse Recovery Time | $t_{rr}$ | $I_F$=-7A, | - | 60 | - | ns |
| Reverse Recovery Charge | $Q_{rr}$ | dI/dt=-100A/us | - | 150 | - | nC |
| **Dynamic Characteristics[2]** | | | | | | |
| Gate Resistance | $R_G$ | $V_{GS}$=0V, $V_{DS}$=0V,f=1MHz | - | 4 | - | Ω |
| Input capacitance | $C_{ISS}$ | $V_{GS}$=0V ,$V_{DS}$=-50V f=1.0MHz | - | 4600 | - | pF |
| Output capacitance | $C_{OSS}$ | | - | 230 | - | |
| Reverse transfer capacitance | $C_{RSS}$ | | - | 175 | - | |
| Turn-on delay time | $t_{D(ON)}$ | $V_{GS}$=-10V, $V_{DD}$=-50V, | - | 15 | - | ns |

| Turn-on Rise time | $t_r$ | $R_D=2.4\Omega$, $I_D=-7.7A$, $R_G=1\Omega$ | - | 20 | - | |
|---|---|---|---|---|---|---|
| Turn-off delay time | $t_{D(OFF)}$ | | - | 110 | - | |
| Turn-off Fall time | tf | | - | 100 | - | |
| Total gate charge | $Q_g$ | $V_{GS}=-4.5V$, $I_D=-9A$ $V_{DS}=-50V$ | - | 54 | | nC |
| Gate-source charge | $Q_{gs}$ | | | 14 | | |
| Gate-drain charge | $Q_{gd}$ | | - | 26 | - | |

## Typical Performance Characteristics
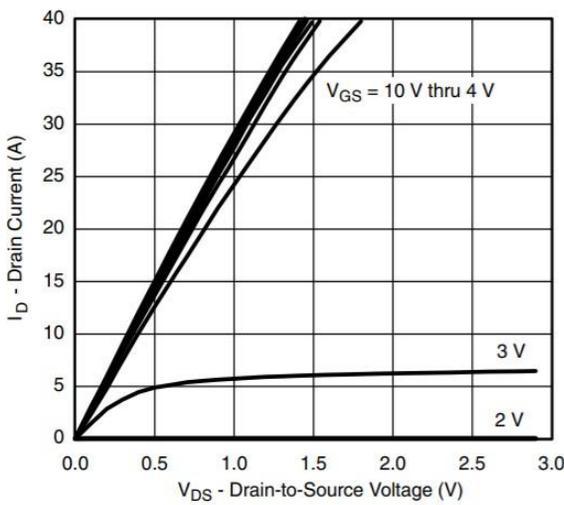


**Output Characteristics**
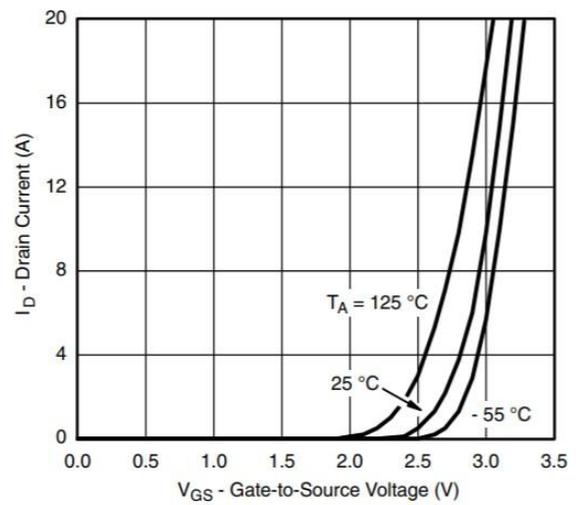


**Transfer Characteristics**
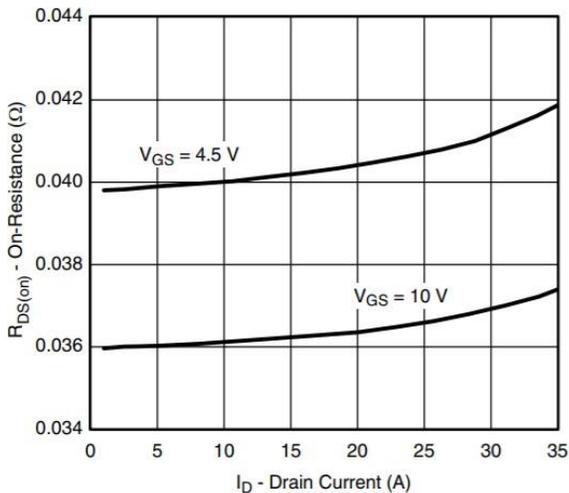


**On-Resistance vs. Drain Current and Gate Voltage**



**Capacitance**

**Gate Charge**



**On-Resistance vs. Junction Temperature**



**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-to-Source Voltage**



**Threshold Voltage**



**Single Pulse Power, Junction-to-Ambient**
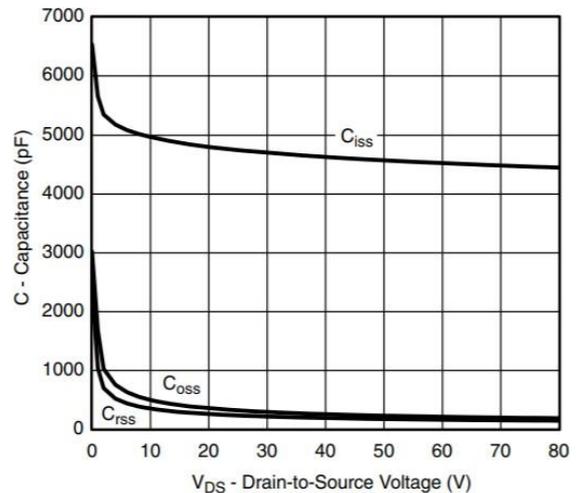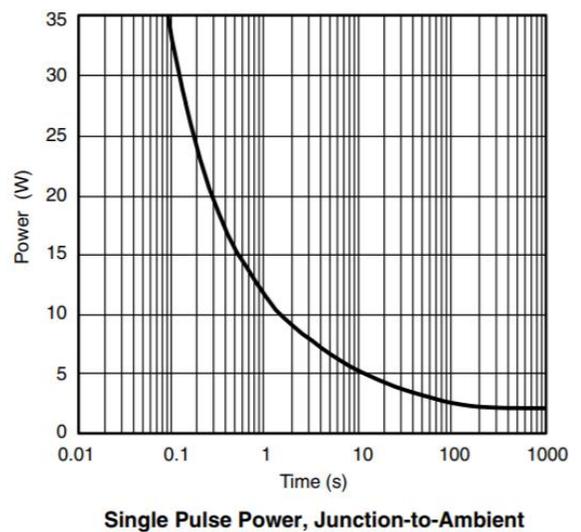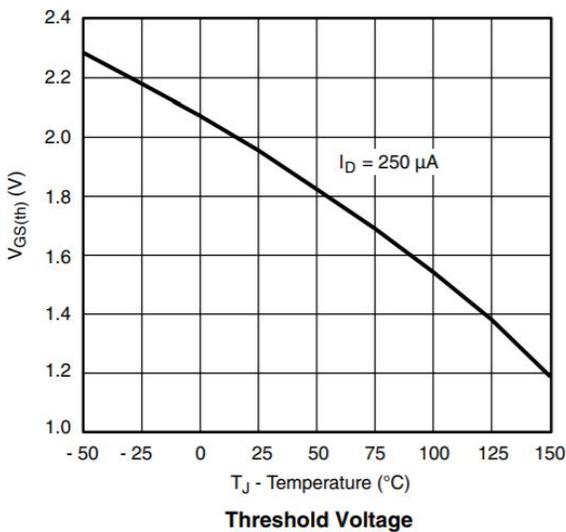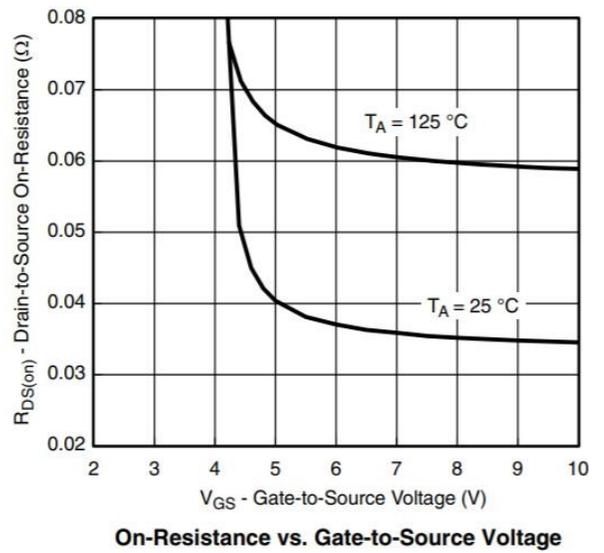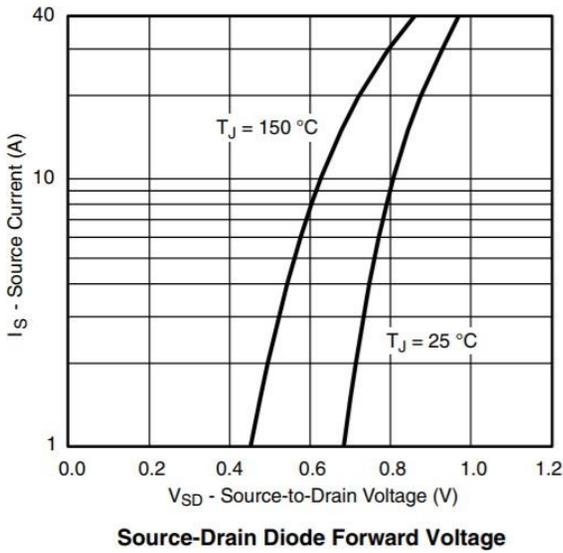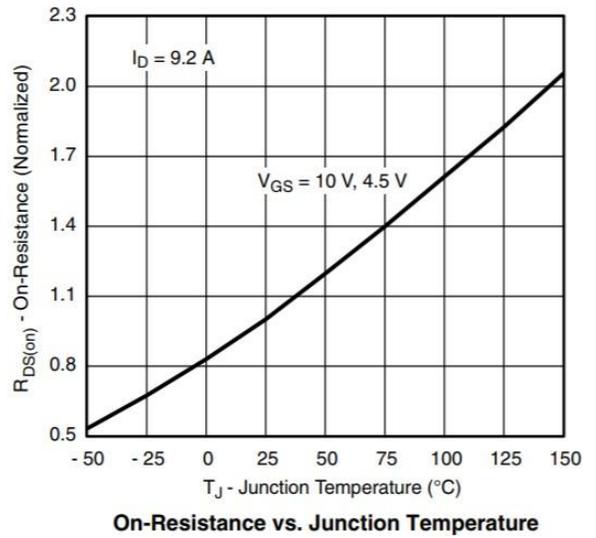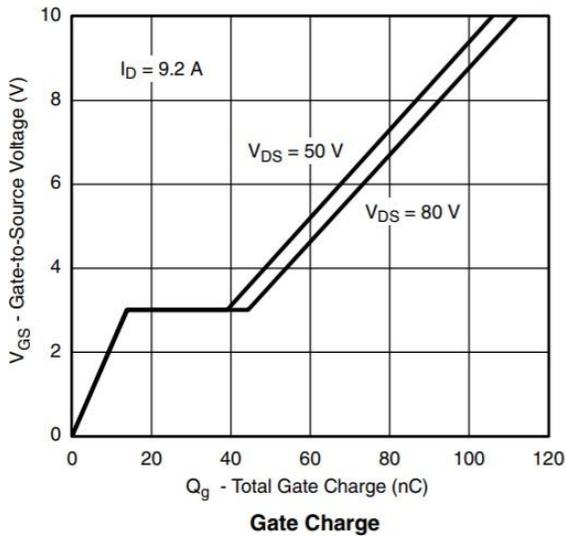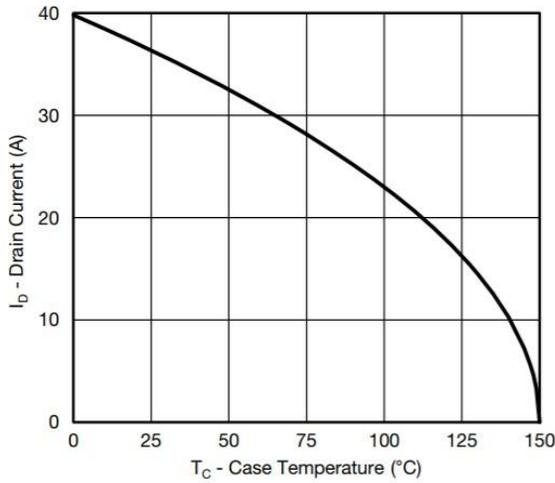
**Current Derating***



**Single Pulse Power, Junction-to-Ambient**



* $V_{GS}$ > minimum $V_{GS}$ at which $R_{DS(on)}$ is specified
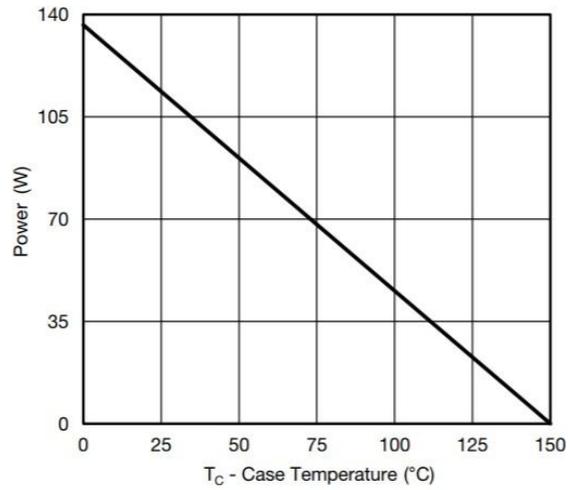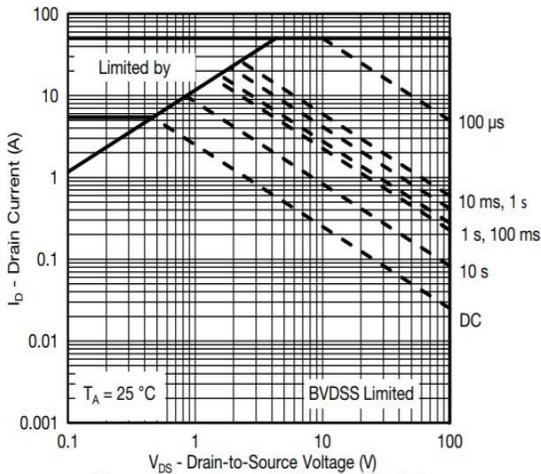
**Safe Operating Area, Junction-to-Ambient**



$$T_A = \frac{L \cdot I_A}{BV - V_{DD}}$$

**Single Pulse Avalance Capability**



Notes:

1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = $R_{thJA}$ = 50 °C/W
3. $T_{JM} - T_A = P_{DM}Z_{thJA}{}^{(t)}$
4. Surface Mounted
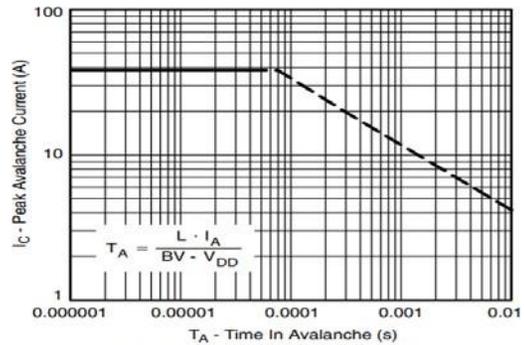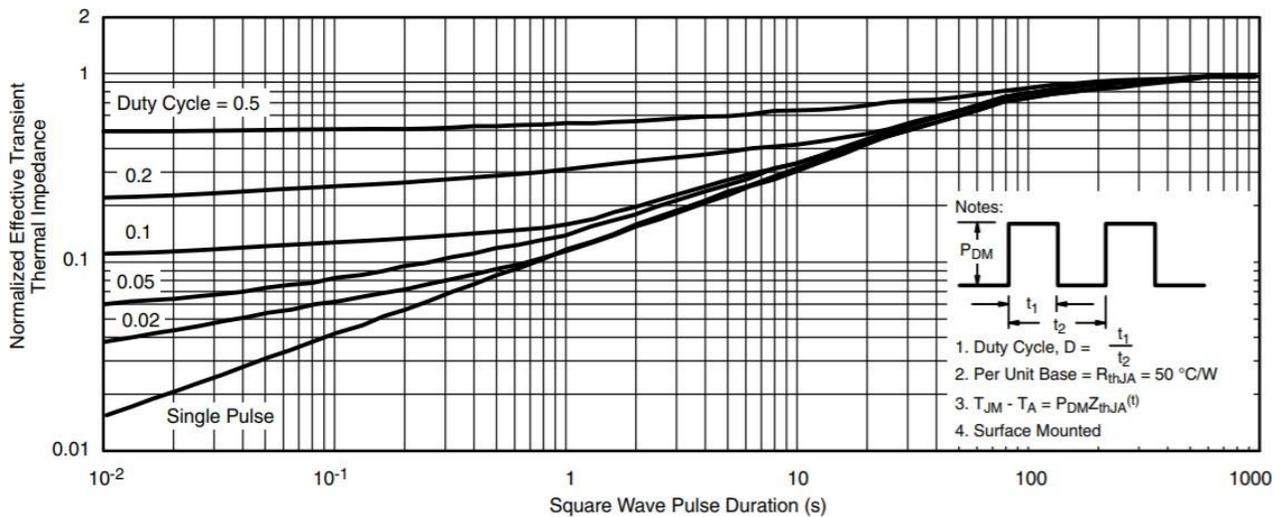
**Normalized Thermal Transient Impedance, Junction-to-Ambient**

## Package Information

● TO-252-2L
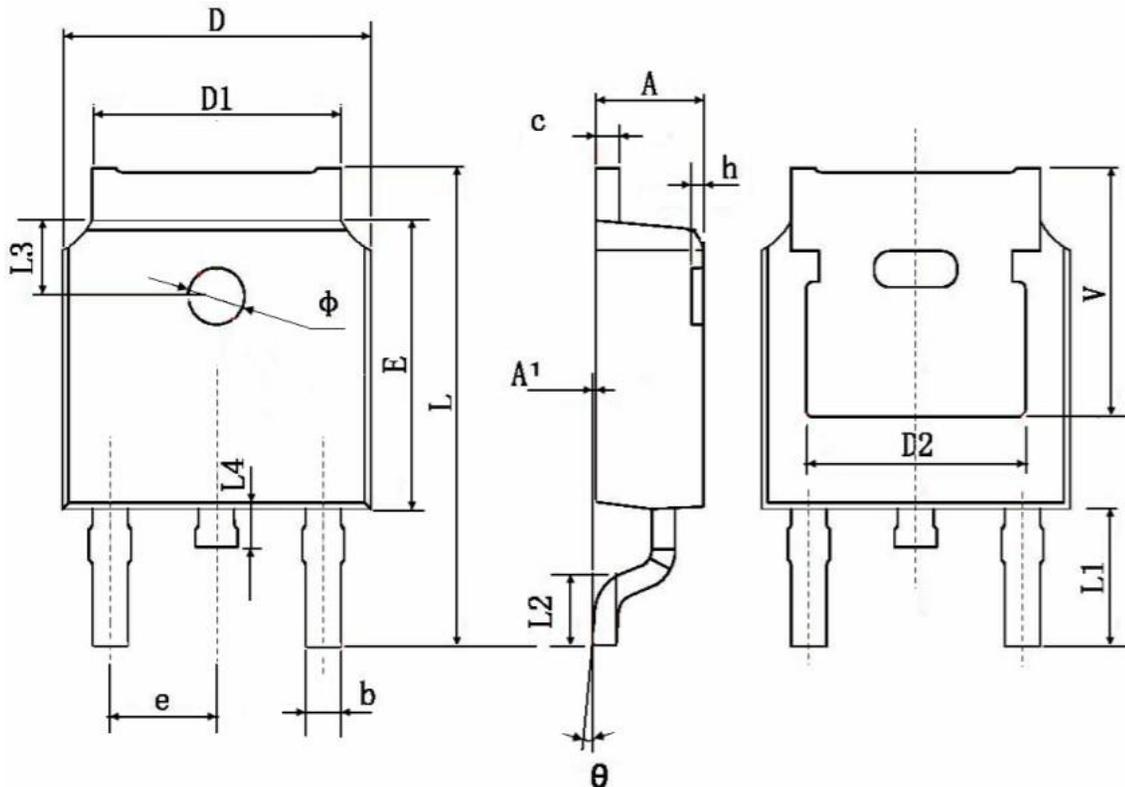


| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|---|---|---|---|---|
| | Min. | Max. | Min. | Max. |
| A | 2.200 | 2.400 | 0.087 | 0.094 |
| A1 | 0.000 | 0.127 | 0.000 | 0.005 |
| b | 0.660 | 0.860 | 0.026 | 0.034 |
| c | 0.460 | 0.580 | 0.018 | 0.023 |
| D | 6.500 | 6.700 | 0.256 | 0.264 |
| D1 | 5.100 | 5.460 | 0.201 | 0.215 |
| D2 | 4.830 TYP. | | 0.190 TYP. | |
| E | 6.000 | 6.200 | 0.236 | 0.244 |
| e | 2.186 | 2.386 | 0.086 | 0.094 |
| L | 9.800 | 10.400 | 0.386 | 0.409 |
| L1 | 2.900 TYP. | | 0.114 TYP. | |
| L2 | 1.400 | 1.700 | 0.055 | 0.067 |
| L3 | 1.600 TYP. | | 0.063 TYP. | |
| L4 | 0.600 | 1.000 | 0.024 | 0.039 |
| Φ | 1.100 | 1.300 | 0.043 | 0.051 |
| θ | 0° | 8° | 0° | 8° |
| h | 0.000 | 0.300 | 0.000 | 0.012 |
| V | 5.350 TYP. | | 0.211 TYP. | |