

## Description

This 40V 13.5A N-Channel Enhancement Mode Field Effect Transistor in a SOP-8 Plastic Package

## Applications

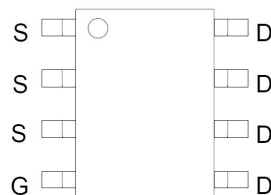
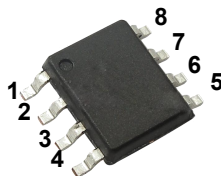
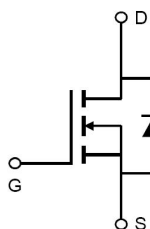
Suitable for use in a wide range of power conversion applications.

## Features

- Uses advanced trench technology to provide excellent  $R_{DS(ON)}$  with low gate charge.
- Halogen-free Product.

| $V_{DSS}$ | $R_{DS(ON)}$ Typ | $I_D$ |
|-----------|------------------|-------|
| 40V       | 8.2m $\Omega$    | 13.5A |

## Equivalent Circuit & Pinning



PIN1、PIN 2、PIN 3: Source      PIN 4 : Gate

PIN5、PIN 6、PIN 7、PIN 8: Drain

**Absolute Maximum Ratings(Ta=25°C)**

| Parameter                                                        |                          | Symbol          | Rating   |              | Unit                 |
|------------------------------------------------------------------|--------------------------|-----------------|----------|--------------|----------------------|
|                                                                  |                          |                 | 10Sec    | Steady State |                      |
| Drain-Source Voltage                                             |                          | $V_{DS}$        | 40       |              | V                    |
| Gate-Source Voltage                                              |                          | $V_{GS}$        | $\pm 20$ |              | V                    |
| Drain Current –Continuous <sup>A</sup>                           | $T_A=25^{\circ}\text{C}$ | $I_D$           | 13.5     | 10           | A                    |
|                                                                  | $T_A=70^{\circ}\text{C}$ |                 | 10.8     | 8.0          | A                    |
| Pulsed Drain Current <sup>B</sup>                                |                          | $I_{DM}$        | 120      |              | A                    |
| Avalanche Current <sup>G</sup>                                   |                          | $I_{AR}$        | 23       |              | A                    |
| Repetitive avalanche energy $L=0.3\text{mH}$ <sup>G</sup>        |                          | $E_{AR}$        | 79       |              | mJ                   |
| Power Dissipation for Single Operation <sup>A</sup>              | $T_A=25^{\circ}\text{C}$ | $P_D$           | 3.1      | 1.7          | W                    |
|                                                                  | $T_A=70^{\circ}\text{C}$ |                 | 2.0      | 1.1          |                      |
| Thermal Resistance, Junction-to-Ambient <sup>A</sup>             | $t \leq 10\text{S}$      | $R_{\theta JA}$ | 40       |              | $^{\circ}\text{C/W}$ |
|                                                                  | Steady State             | $R_{\theta JA}$ | 75       |              | $^{\circ}\text{C/W}$ |
| Thermal Resistance, Junction-to Lead <sup>A</sup> (Steady State) |                          | $R_{\theta JI}$ | 24       |              | $^{\circ}\text{C/W}$ |
| Operating and Junction Temperature Range                         |                          | $T_j$ $T_{stg}$ | -55~150  |              | $^{\circ}\text{C}$   |

**Electrical Characteristics(Ta=25°C)**

| Parameter                         | Symbol       | Test Conditions                                                 | Min | Typ  | Max       | Unit          |
|-----------------------------------|--------------|-----------------------------------------------------------------|-----|------|-----------|---------------|
| Drain-Source Breakdown Voltage    | $BV_{DS}$    | $V_{GS}=0\text{V}$ $I_D=250\mu\text{A}$                         | 40  |      |           | V             |
| Zero Gate Voltage Drain Current   | $I_{DSS}$    | $V_{DS}=40\text{V}$ $V_{GS}=0\text{V}$                          |     |      | 1.0       | $\mu\text{A}$ |
|                                   |              | $V_{DS}=40\text{V}$ $V_{GS}=0\text{V}$ $T_J=55^{\circ}\text{C}$ |     |      | 5.0       | $\mu\text{A}$ |
| Gate-Body Leakage Current Forward | $I_{GSS}$    | $V_{GS}=\pm 20\text{V}$ $V_{DS}=0\text{V}$                      |     |      | $\pm 100$ | nA            |
| Gate Threshold Voltage            | $V_{GS(th)}$ | $V_{DS}=V_{GS}$ $I_D=250\mu\text{A}$                            | 1.0 | 1.4  | 2.0       | V             |
| Static Drain-Source On-Resistance | $R_{DS(on)}$ | $V_{GS}=10\text{V}$ $I_D=10\text{A}$                            |     | 8.2  | 10        | m $\Omega$    |
|                                   |              | $V_{GS}=10\text{V}$ $I_D=10\text{A}$ $T_J=125^{\circ}\text{C}$  |     | 12.5 | 16        |               |
|                                   |              | $V_{GS}=4.5\text{V}$ $I_D=8.0\text{A}$                          |     | 12   | 15        |               |
| Diode Forward Voltage             | $V_{SD}$     | $I_S=1\text{A}$ $V_{GS}=0\text{V}$                              |     | 0.72 | 1.0       | V             |
| Forward Transconductance          | $g_{FS}$     | $V_{DS}=5\text{V}$ $I_D=5\text{A}$                              |     | 10   |           | S             |

## Electrical Characteristics(Ta=25°C)

| Parameter                                     | Symbol       | Test Conditions                                                      | Min | Typ  | Max  | Unit     |
|-----------------------------------------------|--------------|----------------------------------------------------------------------|-----|------|------|----------|
| Input Capacitance                             | $C_{iss}$    | $V_{DS}=15V \quad V_{GS}=0V$<br>$f=1.0MHz$                           |     | 1500 | 1950 | pF       |
| Output Capacitance                            | $C_{oss}$    |                                                                      |     | 215  |      |          |
| Reverse Transfer Capacitance                  | $C_{rss}$    |                                                                      |     | 135  |      |          |
| Total Gate Charge(10V)                        | $Q_g$        | $V_{DS}=20V \quad I_D=10A$<br>$V_{GS}=10V$                           |     | 27.2 | 37   | nC       |
| Total Gate Charge(4.5V)                       |              |                                                                      |     | 13.6 | 18   |          |
| Gate-Source Charge                            | $Q_{gs}$     |                                                                      |     | 4.5  |      |          |
| Gate-Drain Charge                             | $Q_{gd}$     |                                                                      |     | 6.4  |      |          |
| Gate resistance                               | $R_g$        | $V_{GS}=0V \quad V_{DS}=0V$<br>$f=1MHz$                              | 2.0 | 3.5  | 5.0  | $\Omega$ |
| Turn-On Delay Time                            | $t_{d(on)}$  | $V_{DS}=20V \quad R_L=2\Omega$<br>$V_{GS}=10V \quad R_{GEN}=3\Omega$ |     | 6.4  |      | ns       |
| Turn-On Rise Time                             | $t_r$        |                                                                      |     | 17.2 |      |          |
| Turn-Off Delay Time                           | $t_{d(off)}$ |                                                                      |     | 29.6 |      |          |
| Turn-Off Fall Time                            | $t_f$        |                                                                      |     | 16.8 |      |          |
| Continuous Drain-Source Diode Forward Current | $I_S$        |                                                                      |     |      | 2.5  | A        |
| Body Diode Reverse Recovery Time              | $t_{rr}$     | $I_F=10A$<br>$dI/dt=100A/\mu s$                                      |     | 30   | 40   | ns       |
| Body Diode Reverse Recovery Charge            | $Q_{rr}$     |                                                                      |     | 19   |      | nC       |

## Notes:

A: The value of  $R_{\theta JA}$  is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The value in any given application depends on the user's specific board design.

B: Repetitive rating, pulse width limited by junction temperature.

C: The  $R_{\theta JA}$  is the sum of the thermal impedance from junction to lead  $R_{\theta JL}$  and lead to ambient.

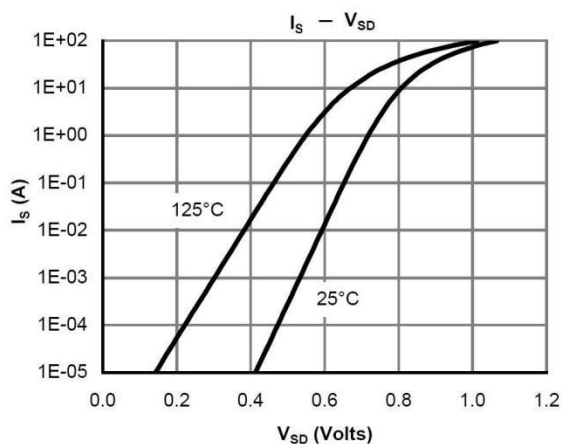
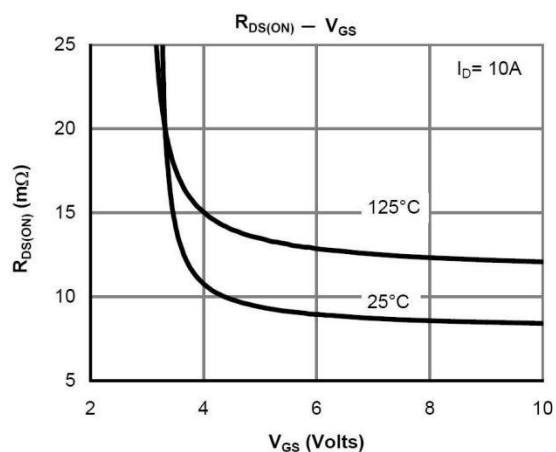
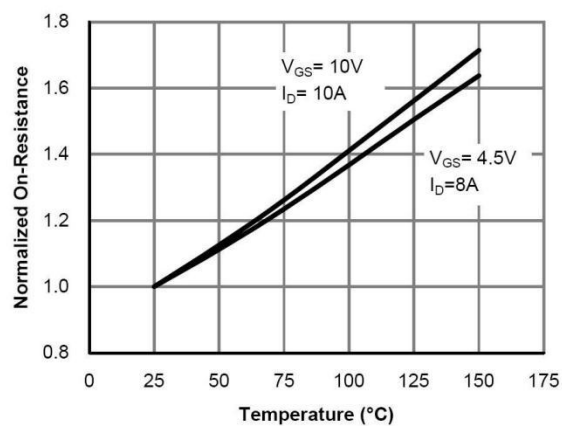
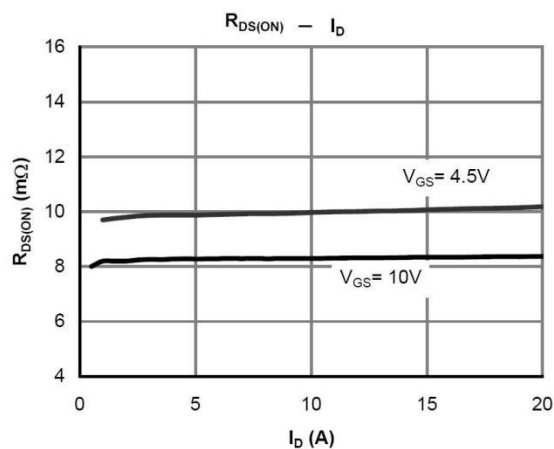
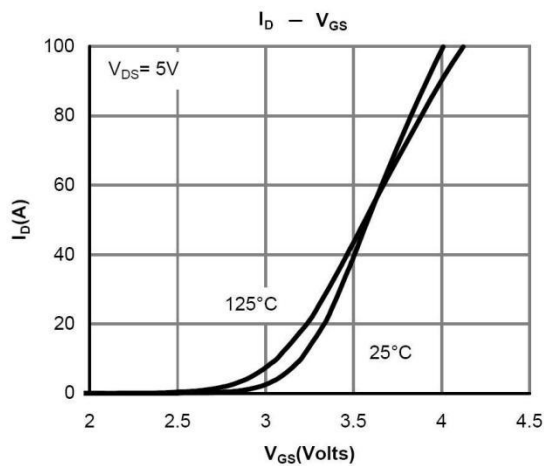
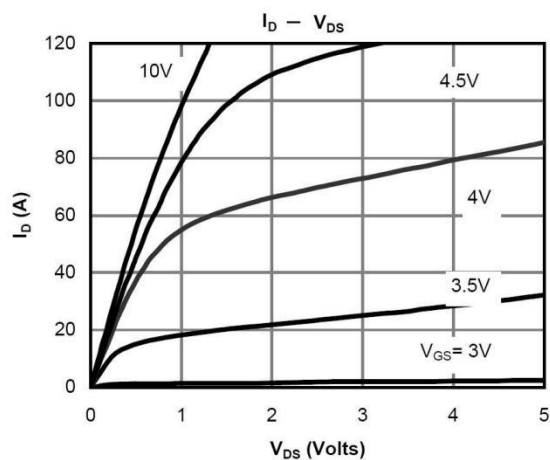
D: The static characteristics in Figures 1 to 6 are obtained using  $t \leq 300\mu s$  pulses, duty cycle 0.5% max.

E: These tests are performed with the device mounted on 1 in2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ . The SOA curve provides a single pulse rating.

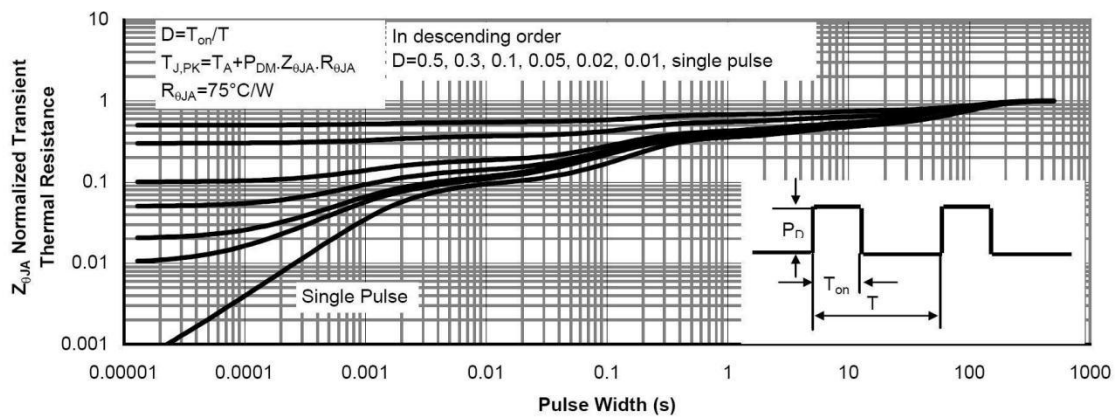
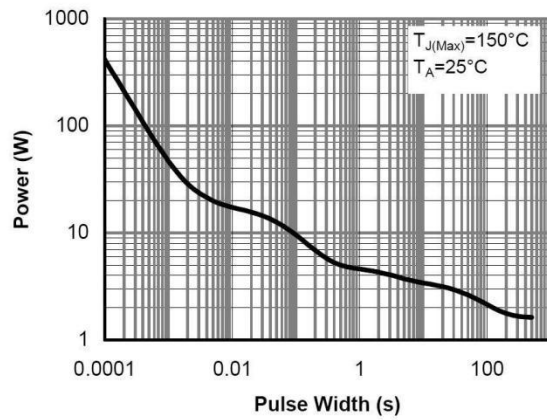
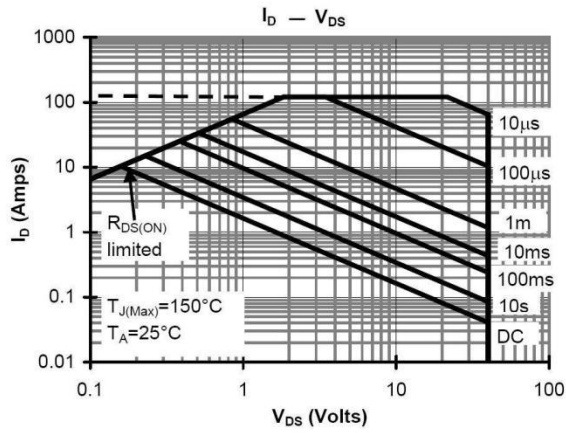
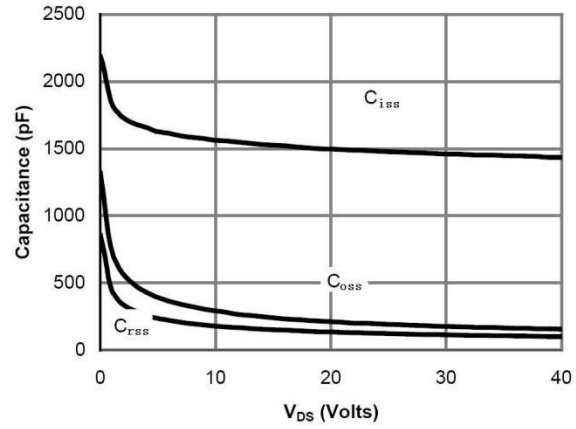
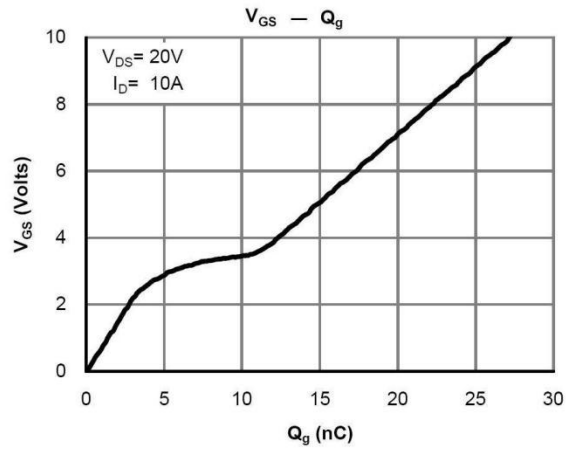
F: The current rating is based on the  $t \leq 10s$  thermal resistance rating.

G:  $E_{AR}$  and  $I_{AR}$  ratings are based on low frequency and duty cycles to keep  $T_J=25^\circ C$ .

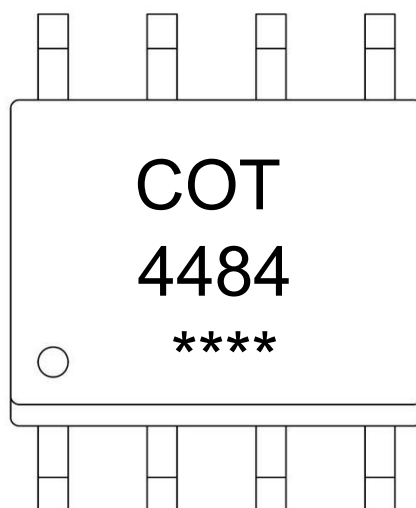
# Electrical Characteristic Curve



Electrical Characteristic Curve



## Marking Instructions



Note:

COT: Company Logo

4484: Product Type.

\*\*\*\*: Lot No. Code, code change with Lot No.

## Packaging SPEC.

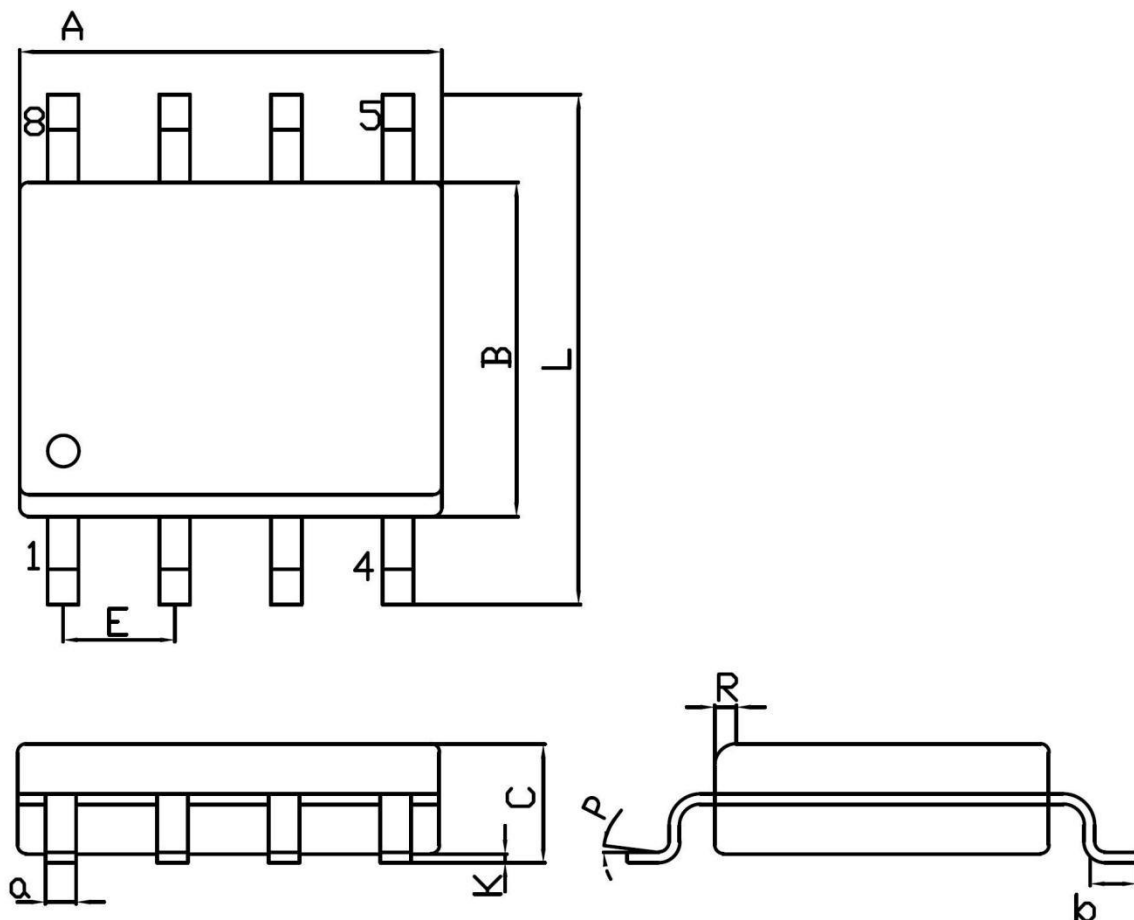
### REEL INFORMATION

| Package Type | Units      |                 |                 |                       |                 | Dimension (unit: mm <sup>3</sup> ) |            |             |
|--------------|------------|-----------------|-----------------|-----------------------|-----------------|------------------------------------|------------|-------------|
|              | Units/Reel | Reels/Inner Box | Units/Inner Box | Inner Boxes/Outer Box | Units/Outer Box | Reel                               | Inner Box  | Outer Box   |
| SOP-8        | 4,000      | 2               | 8,000           | 6                     | 48,000          | 13" x12                            | 360×360×50 | 380×335×366 |

Package Outline Dimensions

SOP-8

Unit:mm



| Symbol | Dimensions In Millimeters |      | Symbol | Dimensions In Millimeters |      |
|--------|---------------------------|------|--------|---------------------------|------|
|        | Min                       | Max  |        | Min                       | Max  |
| A      | 4.70                      | 5.10 | C      | 1.35                      | 1.75 |
| B      | 3.70                      | 4.10 | a      | 0.35                      | 0.49 |
| L      | 5.80                      | 6.20 | R      | 0.30                      | 0.60 |
| E      | 1.27BSC                   |      | P      | 0°                        | 7°   |
| K      | 0.12                      | 0.22 | b      | 0.40                      | 1.25 |