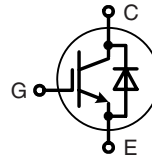


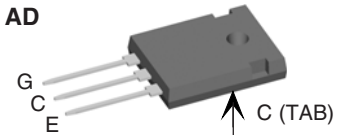
# High Voltage BIMOSFET™ Monolithic Bipolar MOS Transistor

N-Channel, Enhancement Mode



$$\begin{aligned} I_{C25} &= 33 \text{ A} \\ V_{CES} &= 1600 \text{ V} \\ V_{CE(sat)} &= 6.2 \text{ V typ.} \\ t_{fi} &= 40 \text{ ns} \end{aligned}$$

TO-247 AD



G = Gate,  
E = Emitter,

C = Collector,  
TAB = Collector

| Symbol              | Conditions                                                                                                                                                 | Maximum Ratings  |                  |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------|
| $V_{CES}$           | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$                                                                                                            | 1600             | V                |
| $V_{CGR}$           | $T_J = 25^\circ\text{C}$ to $150^\circ\text{C}$ ; $R_{GE} = 1 \text{ M}\Omega$                                                                             | 1600             | V                |
| $V_{GES}$           | Continuous                                                                                                                                                 | $\pm 20$         | V                |
| $V_{GEM}$           | Transient                                                                                                                                                  | $\pm 30$         | V                |
| $I_{C25}$           | $T_C = 25^\circ\text{C}$                                                                                                                                   | 33               | A                |
| $I_{C90}$           | $T_C = 90^\circ\text{C}$                                                                                                                                   | 20               | A                |
| $I_{CM}$            | $T_C = 25^\circ\text{C}$ , 1 ms                                                                                                                            | 40               | A                |
| <b>SSOA (RBSOA)</b> | $V_{GE} = 15 \text{ V}$ , $T_{VJ} = 125^\circ\text{C}$ , $R_G = 22 \Omega$ , $V_{CE} = 0.8 \cdot V_{CES}$<br>Clamped inductive load, $L = 100 \mu\text{H}$ | $I_{CM} = 40$    | A                |
| $P_C$               | $T_C = 25^\circ\text{C}$                                                                                                                                   | 350              | W                |
| $T_J$               |                                                                                                                                                            | -55 ... +150     | $^\circ\text{C}$ |
| $T_{JM}$            |                                                                                                                                                            | 150              | $^\circ\text{C}$ |
| $T_{stg}$           |                                                                                                                                                            | -55 ... +150     | $^\circ\text{C}$ |
| $T_L$               | 1.6 mm (0.063 in) from case for 10 s                                                                                                                       | 300              | $^\circ\text{C}$ |
| $M_d$               | Mounting torque                                                                                                                                            | 1.15/10Nm/lb.in. |                  |
| <b>Weight</b>       |                                                                                                                                                            | 6                | g                |

## Features

- International standard package JEDEC TO-247 AD
- High Voltage BIMOSFET™
  - replaces high voltage Darlington's and series connected MOSFET's
  - lower effective  $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
- Intrinsic diode

## Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- CRT deflection
- Lamp ballasts

## Advantages

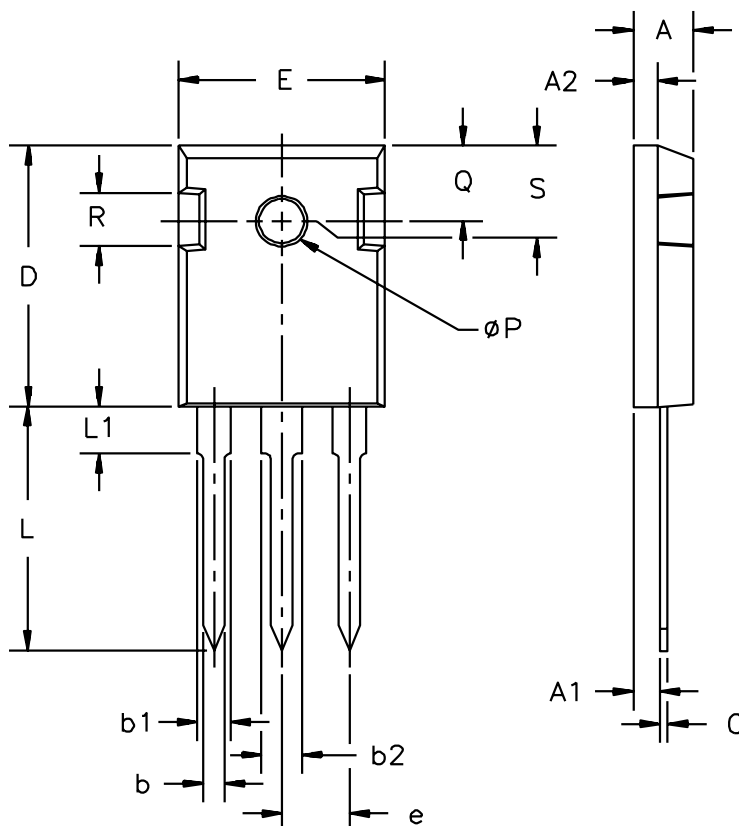
- Easy to mount with 1 screw (isolated mounting screw hole)
- Space savings
- High power density

| Symbol        | Conditions                                                             | Characteristic Values<br>( $T_J = 25^\circ\text{C}$ , unless otherwise specified) |      |                           |
|---------------|------------------------------------------------------------------------|-----------------------------------------------------------------------------------|------|---------------------------|
|               |                                                                        | min.                                                                              | typ. | max.                      |
| $BV_{CES}$    | $I_C = 1 \text{ mA}$ , $V_{GE} = 0 \text{ V}$                          | 1600                                                                              |      | V                         |
| $V_{GE(th)}$  | $I_C = 2 \text{ mA}$ , $V_{CE} = V_{GE}$                               | 4                                                                                 |      | 8 V                       |
| $I_{CES}$     | $V_{CE} = 0.8 \cdot V_{CES}$<br>$V_{GE} = 0 \text{ V}$                 |                                                                                   |      | 400 $\mu\text{A}$<br>3 mA |
| $I_{GES}$     | $V_{CE} = 0 \text{ V}$ , $V_{GE} = \pm 20 \text{ V}$                   |                                                                                   |      | $\pm 500 \text{ nA}$      |
| $V_{CE(sat)}$ | $I_C = I_{C90}$ , $V_{GE} = 15 \text{ V}$<br>$T_J = 125^\circ\text{C}$ |                                                                                   | 6.2  | 7.1 V<br>7.8 V            |

| Symbol                                              | Conditions                                                                                                                                                | Characteristic Values                               |                        |                      |
|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------------------------|----------------------|
|                                                     |                                                                                                                                                           | (T <sub>J</sub> = 25°C, unless otherwise specified) |                        |                      |
|                                                     |                                                                                                                                                           | min.                                                | typ.                   | max.                 |
| $C_{ies}$<br>$C_{oes}$<br>$C_{res}$                 | $V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}, f = 1 \text{ MHz}$                                                                                          |                                                     | 3300<br>220<br>30      | pF<br>pF<br>pF       |
| $Q_g$                                               | $I_C = 20 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = 15 \text{ V}$                                                                                       |                                                     | 130                    | nC                   |
| $t_{d(on)}$<br>$t_{ri}$<br>$t_{d(off)}$<br>$t_{fi}$ | <b>Inductive load, T<sub>J</sub> = 125°C</b><br>$I_C = I_{C90}, V_{GE} = 15 \text{ V}, L = 100 \mu\text{H},$<br>$V_{CE} = 960 \text{ V}, R_G = 22 \Omega$ |                                                     | 200<br>60<br>270<br>40 | ns<br>ns<br>ns<br>ns |
| $R_{thJC}$<br>$R_{thCK}$                            |                                                                                                                                                           |                                                     | 0.25                   | 0.35 K/W<br>K/W      |

| Symbol | Conditions                                                                                                          | Characteristic Values                               |      |      |
|--------|---------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|------|------|
|        |                                                                                                                     | (T <sub>J</sub> = 25°C, unless otherwise specified) |      |      |
|        |                                                                                                                     | min.                                                | typ. | max. |
| $V_F$  | $I_F = I_{C90}, V_{GE} = 0 \text{ V}, \text{Pulse test}$<br>$t \leq 300 \mu\text{s}, \text{duty cycle } d \leq 2\%$ |                                                     | 2.5  | 5 V  |

## TO-247 AD Outline



| Dim. | Millimeter |       | Inches |       |
|------|------------|-------|--------|-------|
|      | Min.       | Max.  | Min.   | Max.  |
| A    | 19.81      | 20.32 | 0.780  | 0.800 |
| B    | 20.80      | 21.46 | 0.819  | 0.845 |
| C    | 15.75      | 16.26 | 0.610  | 0.640 |
| D    | 3.55       | 3.65  | 0.140  | 0.144 |
| E    | 4.32       | 5.49  | 0.170  | 0.216 |
| F    | 5.4        | 6.2   | 0.212  | 0.244 |
| G    | 1.65       | 2.13  | 0.065  | 0.084 |
| H    | -          | 4.5   | -      | 0.177 |
| J    | 1.0        | 1.4   | 0.040  | 0.055 |
| K    | 10.8       | 11.0  | 0.426  | 0.433 |
| L    | 4.7        | 5.3   | 0.185  | 0.209 |
| M    | 0.4        | 0.8   | 0.016  | 0.031 |
| N    | 1.5        | 2.49  | 0.087  | 0.102 |

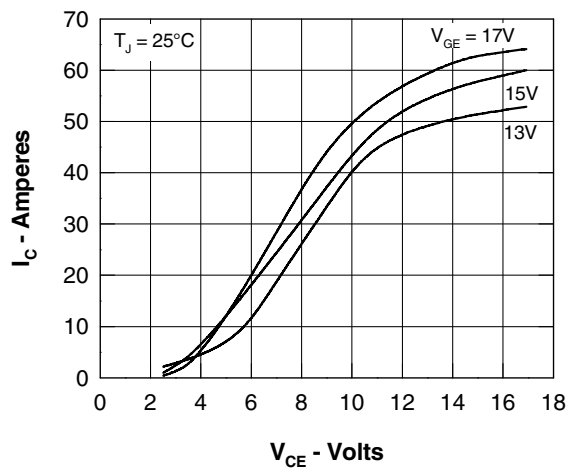


Fig. 1 Typ. Output Characteristics

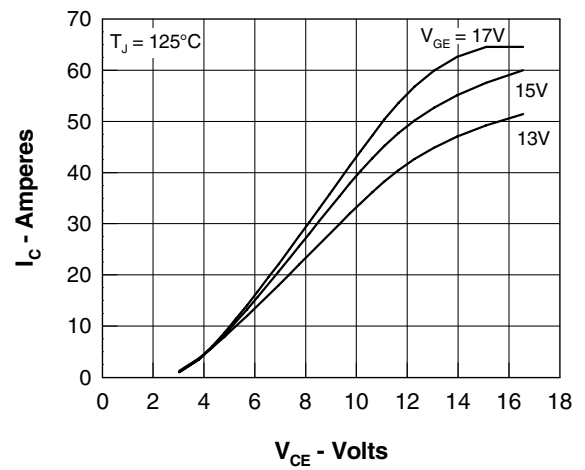


Fig. 2 Typ. Output Characteristics

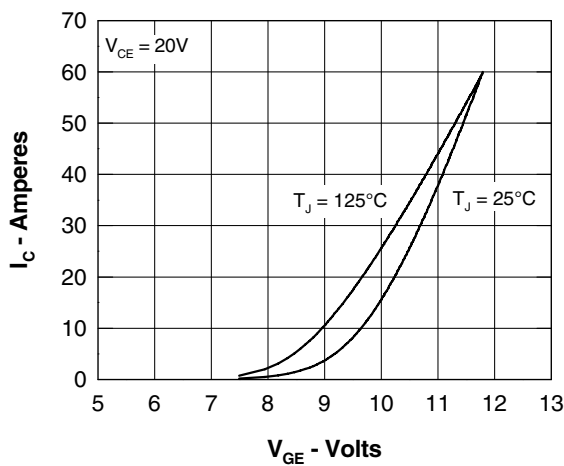


Fig. 3 Typ. Transfer Characteristics

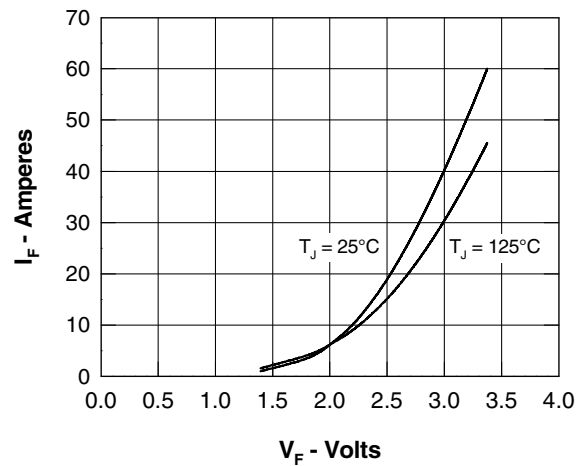


Fig. 4 Typ. Characteristics of Reverse Conduction

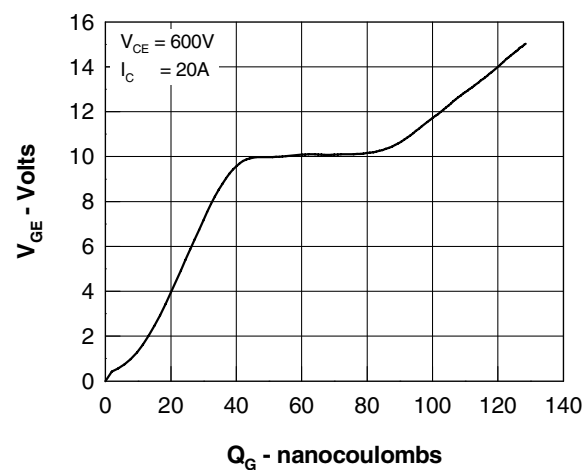


Fig. 5 Typ. Gate Charge characteristics

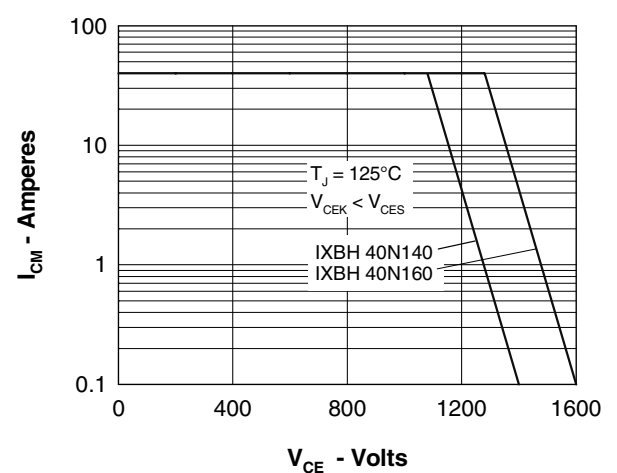


Fig. 6 Reverse Based Safe Operating Area RBSOA

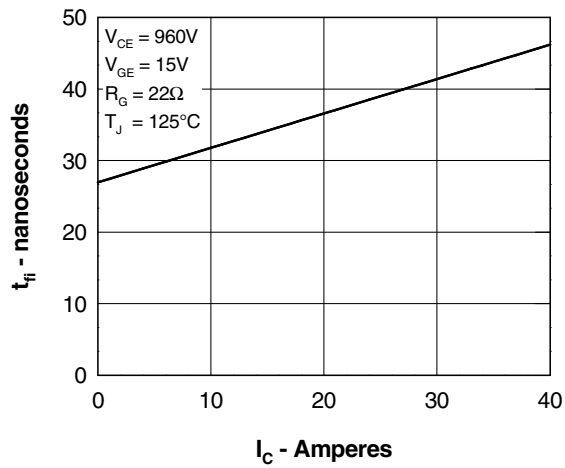


Fig. 7 Typ. Fall Time

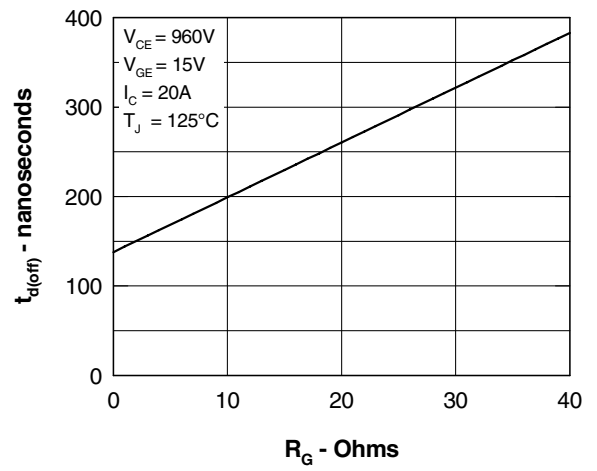


Fig. 8 Typ. Turn Off Delay Time

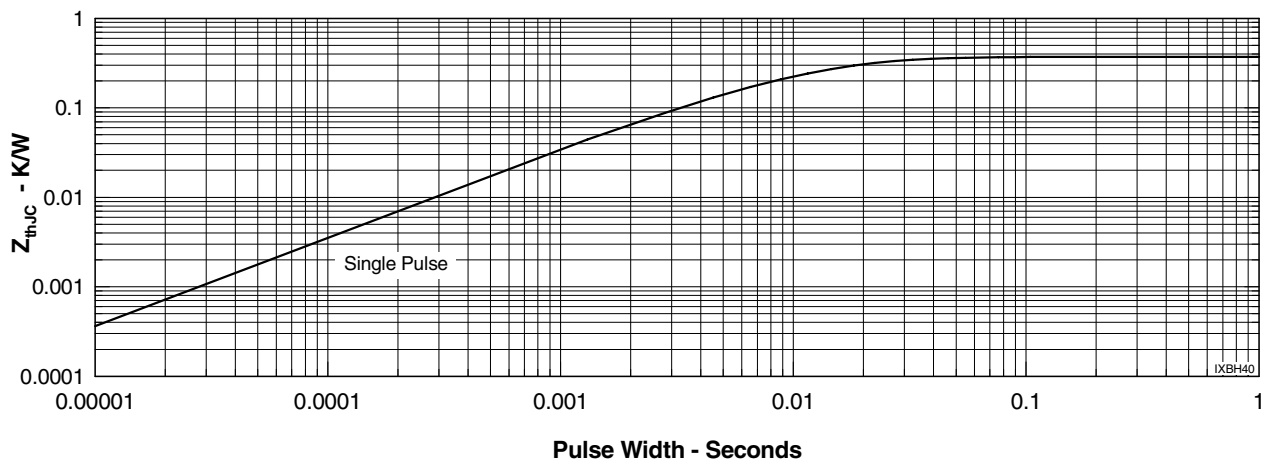


Fig. 9 Typ. Transient Thermal Impedance



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