**ON Semiconductor®**

# FGD2736G3-F085

## EcoSPARK$^{TM}$ 3 270mJ, 360V, N-Channel Ignition IGBT

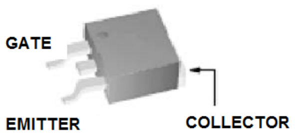
### Features

- SCIS Energy = 270mJ at $T_J = 25°C$
- SCIS Energy = 170mJ at $T_J = 150°C$
- Logic Level Gate Drive
- RoHS Compliant

### Applications

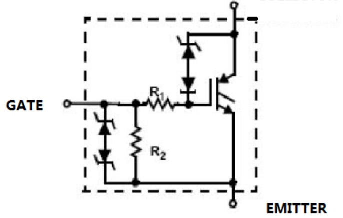
- Automotive Ignition Coil Driver Circuits
- Coil On Plug Applications

### Package



JEDEC TO-252
D-Pak

### Symbol



## Absolute Maximum Ratings $T_A = 25°C$ unless otherwise noted

| Symbol | Parameter | | Ratings | Units |
|---|---|---|---|---|
| $BV_{CER}$ | Collector to Emitter Breakdown Voltage ($I_C$ = 1mA) | | 360 | V |
| $BV_{ECS}$ | Emitter to Collector Voltage - Reverse Battery Condition ($I_C$ = 10mA) | | 28 | V |
| $E_{SCIS25}$ | $I_{SCIS}$ = 13.4A, L = 3.0mHy, $R_{GE}$ = 1KΩ | $T_C = 25°C$ | 270 | mJ |
| $E_{SCIS150}$ | $I_{SCIS}$ = 10.8A, L = 3.0mHy, $R_{GE}$ = 1KΩ | $T_C = 150°C$ | 170 | mJ |
| $I_{C25}$ | Collector Current Continuous, at $T_C = 25°C$, $V_{GE}$ = 5.0V | | 21 | A |
| $I_{C110}$ | Collector Current Continuous, at $T_C = 110°C$, $V_{GE}$ = 5.0V | | 18 | A |
| $V_{GEM}$ | Gate to Emitter Voltage Continuous | | ±10 | V |
| $P_D$ | Power Dissipation Total | $T_C = 25°C$ | 150 | W |
| | Power Dissipation Derating | $T_C > 25°C$ | 1 | W/°C |
| $T_J$ | Operating Junction Temperature Range | | -40 to +175 | °C |
| $T_{STG}$ | Storage Junction Temperature Range | | -40 to +175 | °C |
| $T_L$ | Max. Lead Temp. for Soldering (Leads at 1.6mm from case for 10s) | | 300 | °C |
| $T_{PKG}$ | Max Lead Temp for soldering (Package Body for 10s) | | 260 | °C |
| ESD | Electrostatic Discharge Voltage at100pF, 1500Ω | | 4 | kV |

## Thermal Characteristics

| | | | |
|---|---|---|---|
| $R_{\theta JC}$ | Thermal Resistance Junction to Case | 1 | °C/W |

## Electrical Characteristics of the IGBT $T_A$ = 25°C unless otherwise noted

### Off Characteristics

| Symbol | Parameter | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $BV_{CER}$ | Collector to Emitter Breakdown Voltage | $V_{GE}$ = 0V,$I_{CE}$ = 2mA,<br>$R_{GE}$ = 1KΩ,<br>$T_J$ = -40 to 150°C | | 330 | - | 390 | V |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | $V_{GE}$ = 0V, $I_{CE}$ = 10mA,<br>$R_{GE}$ = 0Ω,<br>$T_J$ = -40 to 150°C | | 350 | - | 410 | V |
| $BV_{ECS}$ | Emitter to Collector Breakdown Voltage | $V_{GE}$ = 0V, $I_{CE}$ = -75mA,<br>$T_J$ = 25°C | | 28 | - | - | V |
| $BV_{GES}$ | Gate to Emitter Breakdown Voltage | $I_{GES}$ = ±5mA | | ±11 | ±14 | - | V |
| $I_{CER}$ | Collector to Emitter Leakage Current | $V_{CE}$ = 250V, $R_{GE}$ = 1KΩ | $T_J$ = 25°C | - | - | 25 | µA |
| | | | $T_J$ = 150°C | - | - | 1 | mA |
| $I_{ECS}$ | Emitter to Collector Leakage Current | $V_{EC}$=24V | $T_J$ = 25°C | - | - | 1 | mA |
| | | | $T_J$ = 150°C | - | - | 40 | |
| $R_1$ | Series Gate Resistance | | | - | 110 | - | Ω |
| $R_2$ | Gate to Emitter Resistance | | | 10K | - | 30K | Ω |

### On Characteristics

| Symbol | Parameter | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $V_{GE}$ = 4V, $I_{CE}$ = 6A | $T_J$ = 25°C | - | 1.25 | 1.35 | V |
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $V_{GE}$ = 4.5V, $I_{CE}$ = 10A | $T_J$ = 25°C | - | 1.45 | 1.65 | V |
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | | $T_J$ = 150°C | | 1.6 | 1.8 | V |

### Dynamic Characteristics

| Symbol | Parameter | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| $Q_{G(ON)}$ | Gate Charge | $V_{GE}$ = 5V, $V_{CE}$ = 12V, $I_{CE}$ = 10A | | - | 18 | - | nC |
| $V_{GE(TH)}$ | Gate to Emitter Threshold Voltage | $I_{CE}$ = 1mA, $V_{CE}$ = $V_{GE,}$ | $T_J$ = 25°C | 1.3 | 1.6 | 2.2 | V |
| | | | $T_J$ = 150°C | 0.75 | 1.1 | 1.8 | |
| $V_{GEP}$ | Gate to Emitter Plateau Voltage | $V_{CE}$ = 12V, $I_{CE}$ = 10A | | - | 3.0 | - | V |

### Switching Characteristics

| Symbol | Parameter | Test Conditions | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|
| $t_{d(ON)R}$ | Current Turn-On Delay Time-Resistive | $V_{CE}$ = 14V, $R_L$ = 1Ω<br>$V_{GE}$ = 5V, $R_G$ = 1KΩ | - | 0.9 | 4 | µs |
| $t_{rR}$ | Current Rise Time-Resistive | | - | 3 | 7 | µs |
| $t_{d(OFF)L}$ | Current Turn-Off Delay Time-Inductive | $V_{CE}$ = 300V, L = 2mH,<br>$V_{GE}$ = 5V, $R_G$ = 1KΩ | - | 4.4 | 15 | µs |
| $t_{fL}$ | Current Fall Time-Inductive | | - | 1.9 | 15 | µs |

## Ordering Information

| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| FGD2736G3 | FGD2736G3-F085 | TO-252AA | 330mm | 16mm | 2500units |

## Typical Performance Curves

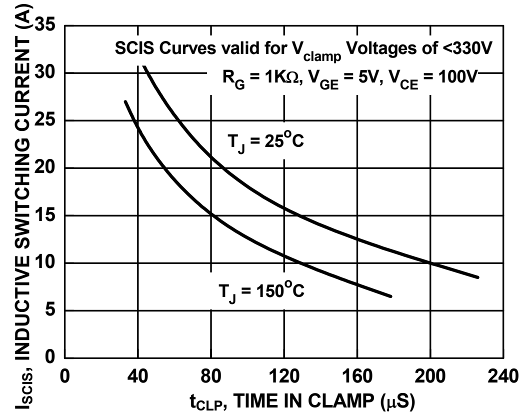


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

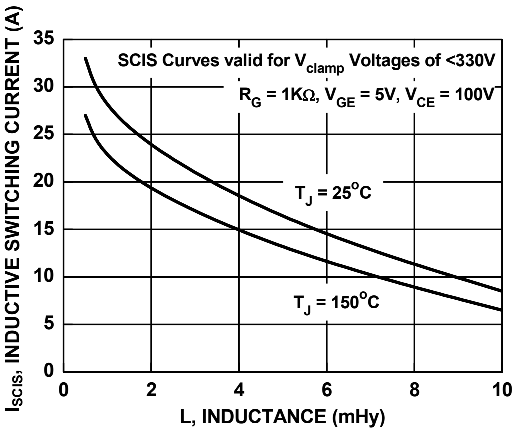


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

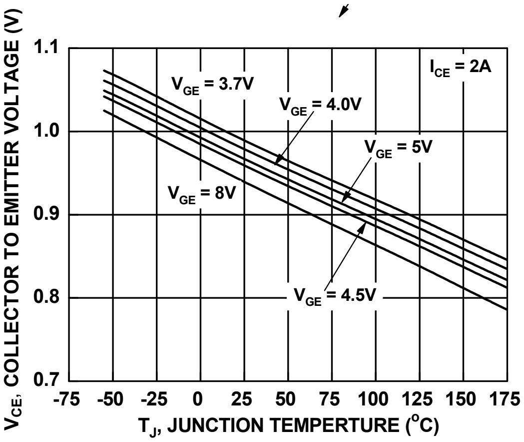


Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

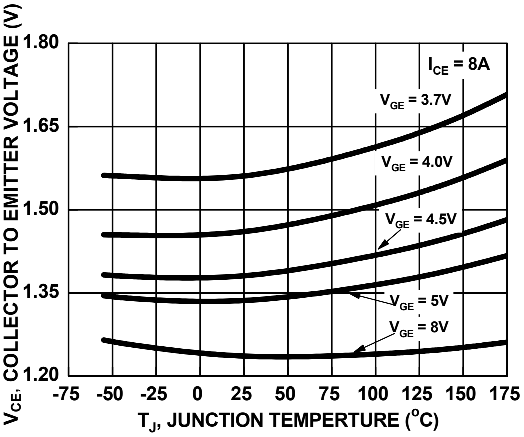


Figure 4. Collector to Emitter On-State Voltage vs. Junction Temperature

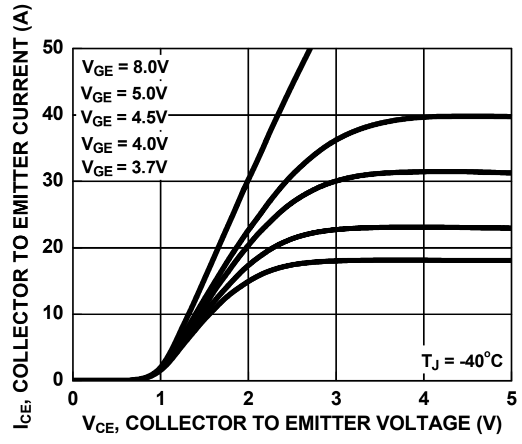


Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

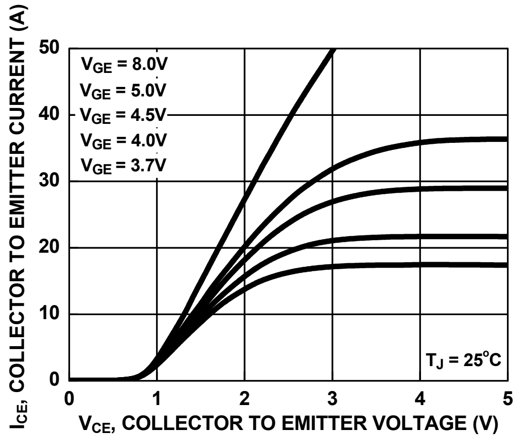


Figure 6. Collector to Emitter On-State Voltage vs. Collector Current

## Typical Performance Curves (Continued)

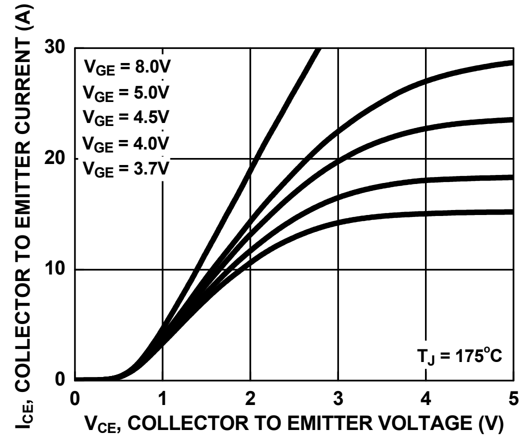


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

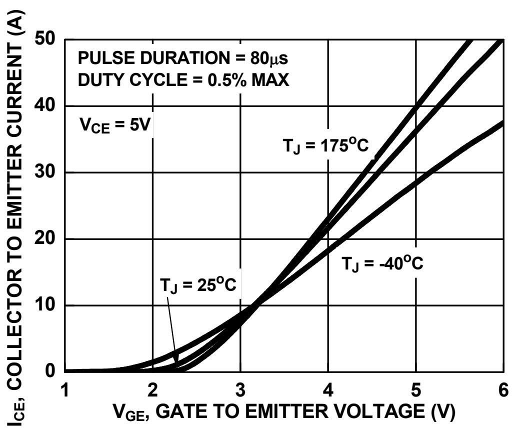


Figure 8. Transfer Characteristics

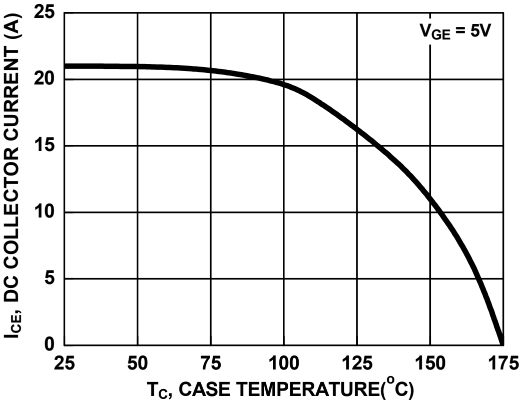


Figure 9. DC Collector Current vs. Case Temperature

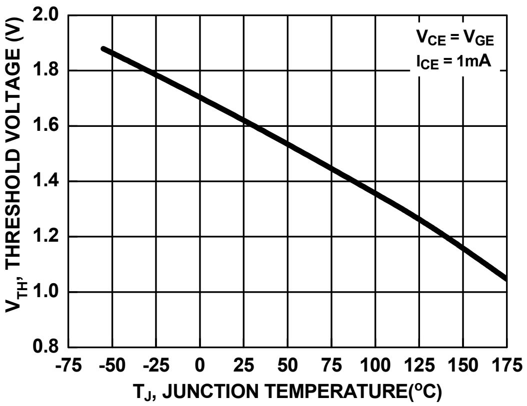


Figure 10. Threshold Voltage vs. Junction Temperature

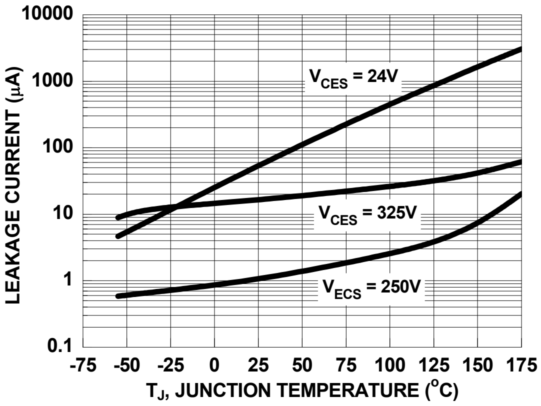


Figure 11. Leakage Current vs. Junction Temperature

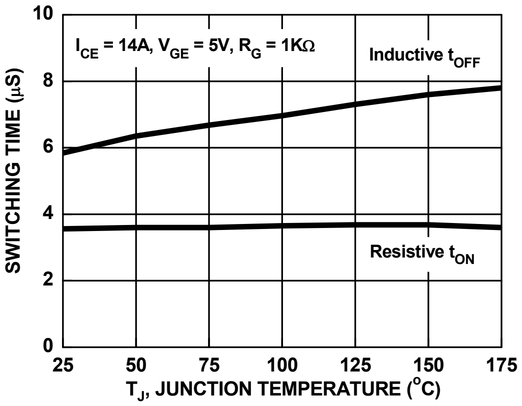


Figure 12. Switching Time vs. Junction Temperature

## Typical Performance Curves (Continued)

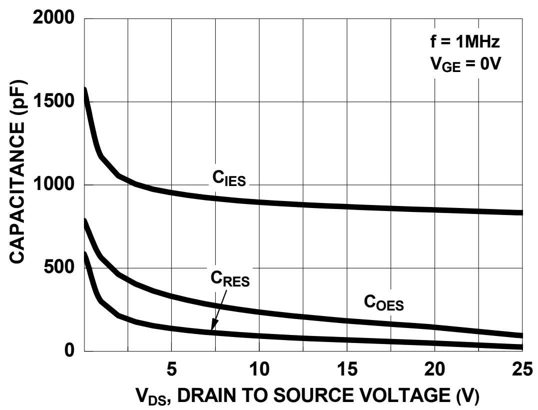


Figure 13. Capacitance vs. Collector to Emitter Voltage

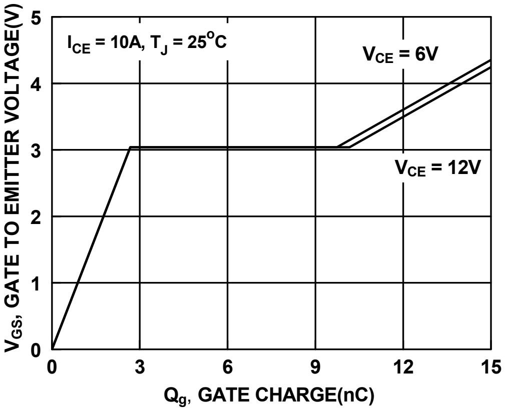


Figure 14. Gate Charge

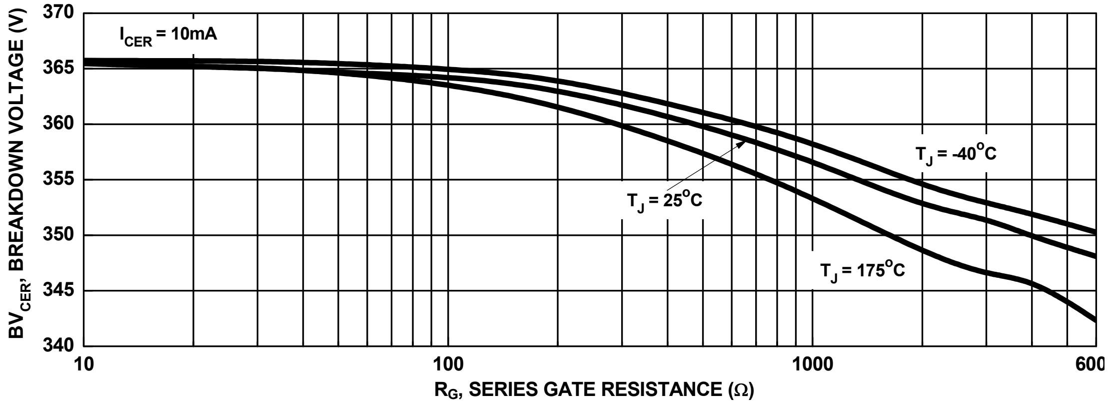


Figure 15. Break down Voltage vs. Series Gate Resistance

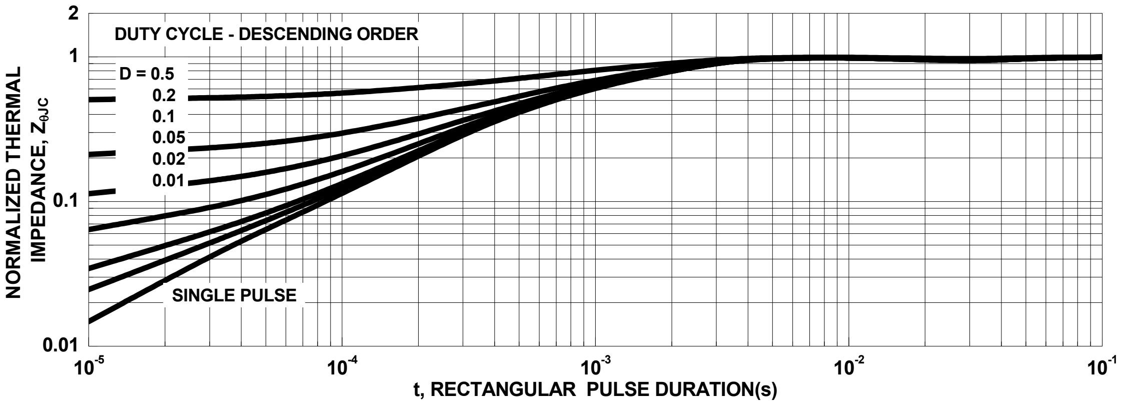


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

## Typical Performance Curves

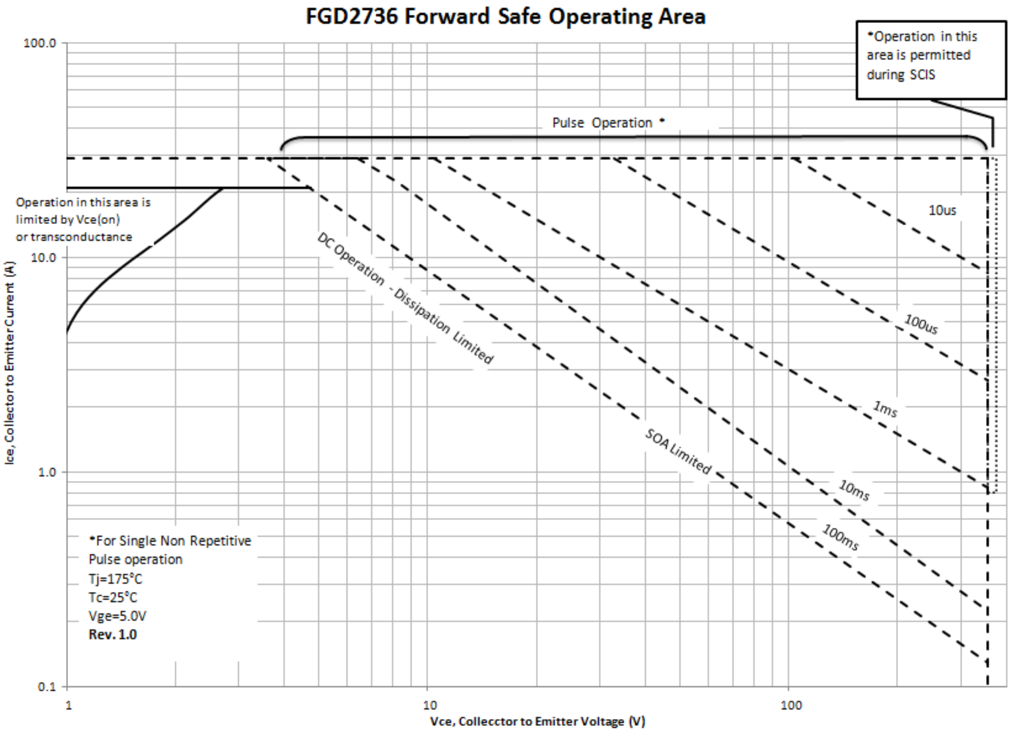
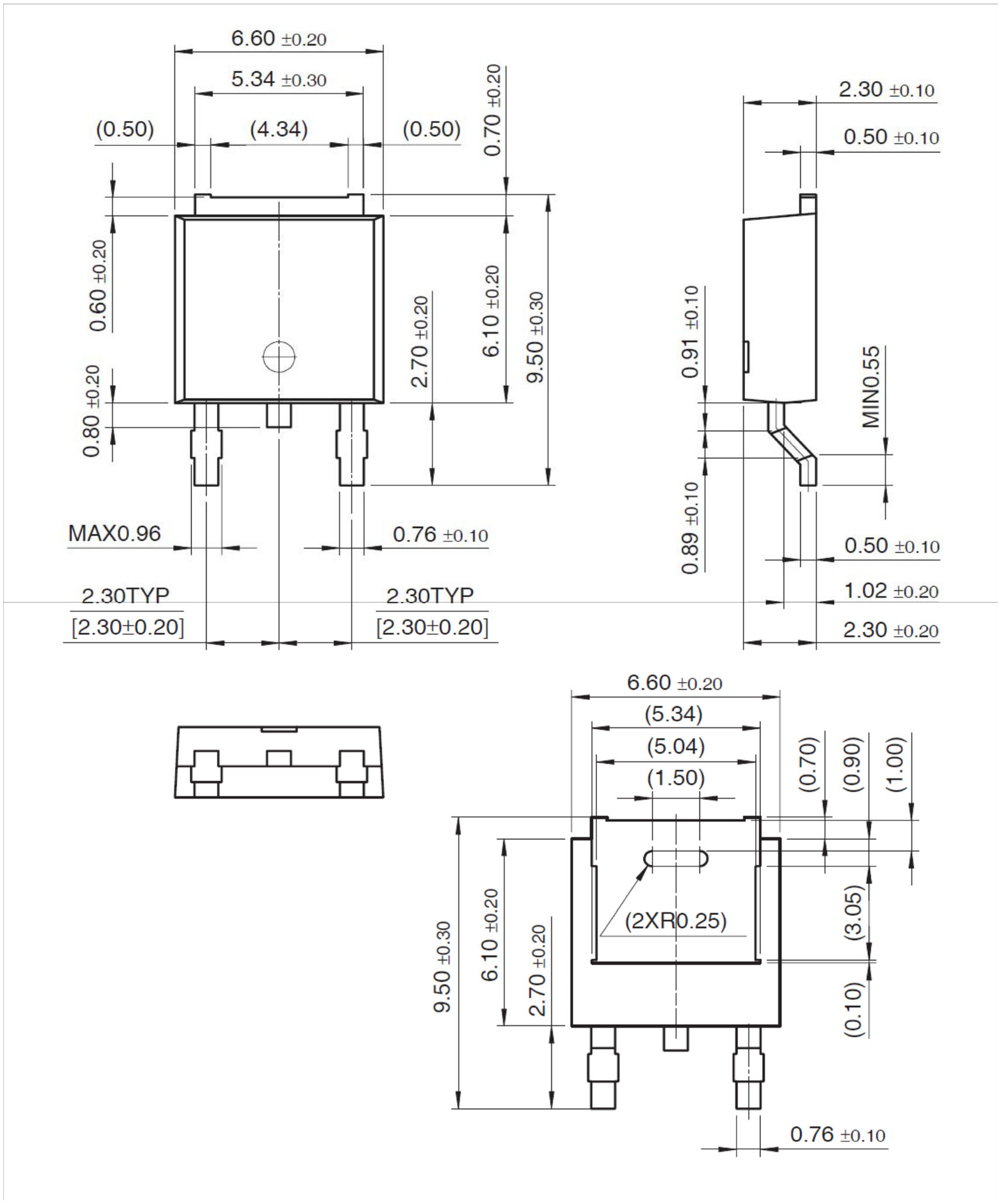


Figure 17. Forward Safe Operating Area

## Physical Dimensions



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**Телефон:** 8 (812) 309 58 32 (многоканальный)
**Факс:** 8 (812) 320-02-42
**Электронная почта:** org@eplast1.ru
**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.