FAIRCHILD SEMICONDUCTOR®

July 2005

# FGR15N40A
# Strobe Flash N-Channel Logic Level IGBT

## Features

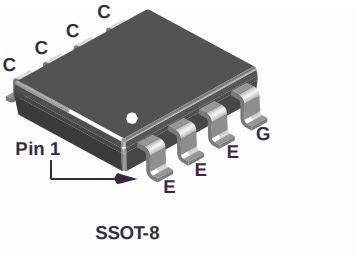
- $V_{CE(SAT)}$ = 4.4V at $I_C$=150A
- $t_{fl}$ = 1.1µs, $td_{(OFF)I}$ = 0.46µs
- 2kV ESD Protected
- High Peak Current Density
- SuperSOT - 8 package, small footprint, low profile (1mm thick)

## Applications

- Camera Strobe

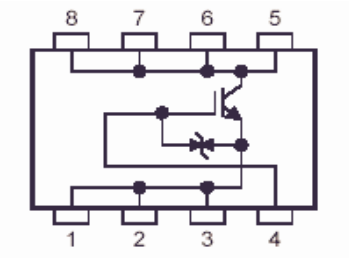
## General Description

This N-Channel IGBT is a MOS gated, logic level device which has been especially tailored for camera flash applications where board space is a premium. These devices have been designed to offer exceptional power dissipation in a very small footprint for applications where bigger, more expensive packages are impractical. The gate is ESD protected with a zener diode.




SSOT-8

## Internal Diagram



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

| Symbol | Parameter | Ratings | Units |
|---|---|---|---|
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | 400 | V |
| $I_C$ | Collector Current Continuous(DC) | 8 | A |
| $I_{CP}$ | Collector Current Pulsed(100µs) | 150 | A |
| $V_{GES}$ | Gate to Emitter Voltage Continuous(DC) | ±6 | V |
| $V_{GEP}$ | Gate to Emitter Voltage Pulsed | ±8 | V |
| $P_D$ | Power Dissipation Total $T_C$ = 25°C | 1.25 | W |
| $T_J$ | Operating Junction Temperature Range | -40 to 150 | °C |
| $T_{STG}$ | Storage Junction Temperature Range | -40 to 150 | °C |
| ESD | Electrostatic Discharge Voltage at 100pF, 1500Ω | 2 | kV |

## Package Marking and Ordering Information

| Device Marking | Device | Package | Tape Width | Quantity |
|---|---|---|---|---|
| 15N40A | FGR15N40A | SuperSOT - 8 | 12mm | 3000 |

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

| Symbol | Parameter | Test Conditions | | Min | Typ | Max | Units |
|---|---|---|---|---|---|---|---|
| **Off State Characteristics** | | | | | | | |
| $BV_{CES}$ | Collector to Emitter Breakdown Voltage | $I_C$ = 1mA, $V_{GE}$ = 0V | | 400 | - | - | V |
| $BV_{GES}$ | Gate-Emitter Breakdown Voltage | $I_{GES}$ = ± 1mA | | ±8 | - | - | V |
| $I_{CES}$ | Collector to Emitter Leakage Current | $V_{CE}$ = 400V | $T_C$ = +25°C | - | - | 10 | µA |
| | | | $T_C$ = +125°C | - | - | 250 | µA |
| $I_{GES}$ | Gate-Emitter Leakage Current | $V_{GE}$ = ± 8V | | - | - | ±10 | µA |
| **On State Characteristics** | | | | | | | |
| $V_{CE(SAT)}$ | Collector to Emitter Saturation Voltage | $I_C$ = 150A, $V_{GE}$ = 4.0V (NOTE 1) | | - | 4.4 | 6.0 | V |
| **Dynamic Characteristics** | | | | | | | |
| $Q_{G(ON)}$ | Gate Charge | $I_C$ = 150A, $V_{CE}$ = 300V, $V_{GE}$ = 8V | | - | 41 | - | nC |
| $V_{GEPL}$ | Gate to Emitter Plateau Voltage | $I_C$ = 150A, $V_{CE}$ = 300V | | - | 3.1 | - | V |
| $V_{GE(TH)}$ | Gate to Emitter Threshold Voltage | $I_C$ = 1.0mA,$V_{CE}$ = $V_{GE}$ | | 0.4 | 0.61 | 0.75 | V |
| $C_{IES}$ | Input Capacitance | $V_{CE}$ = 10V, $V_{GE}$ = 0V, f = 1MHz | | - | 1800 | - | pF |
| **Switching Characteristics** | | | | | | | |
| $t_{ON}$ | Turn-On Time | $V_{CE}$ = 300V, $I_C$ = 150A, | | - | 0.91 | - | µs |
| $t_{d(ON)I}$ | Current Turn-On Delay Time | $V_{GE}$ = 4V, $R_L$ = 2Ω, | | - | 0.18 | - | µs |
| $t_{rI}$ | Current Rise Time | $R_G$ = 51Ω, $T_J$ = 25°C | | - | 0.73 | - | µs |
| $t_{OFF}$ | Turn-Off Time | | | - | 1.56 | - | µs |
| $t_{d(OFF)I}$ | Current Turn-Off Delay Time | | | - | 0.46 | - | µs |
| $t_{fI}$ | Current Fall Time | | | - | 1.1 | - | µs |
| **Thermal Characteristics** | | | | | | | |
| $R_{\theta JA}$ | Thermal Resistance Junction-Case | SuperSOT - 8 (NOTE 2) | | - | 80 | - | °C/W |

**Notes:**

1. Pulse Duration = 100µsec
2. Mounted on a 1 $inch^2$ 1oz copper pad

## Typical Characteristics

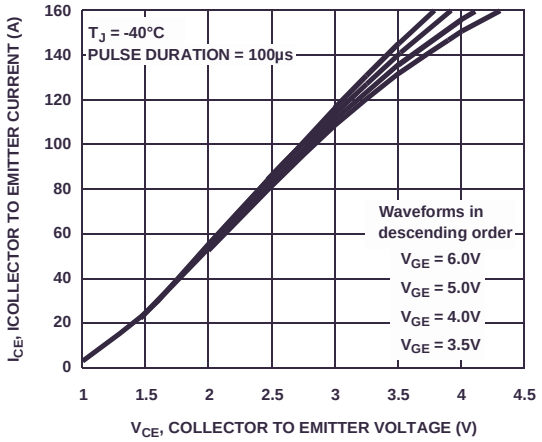



**Figure 1. Collector to Emitter On-State Voltage vs Collector Current**

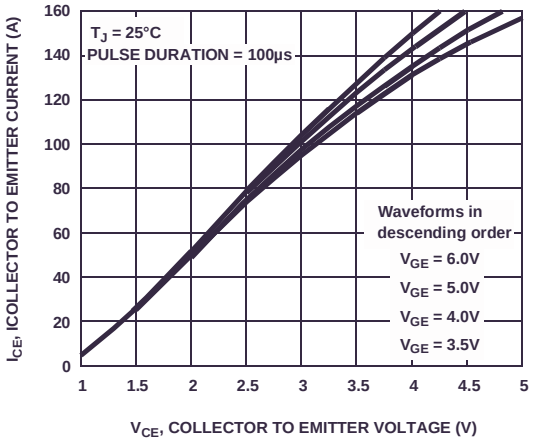



**Figure 2. Collector to Emitter On-State Voltage vs Collector Current**

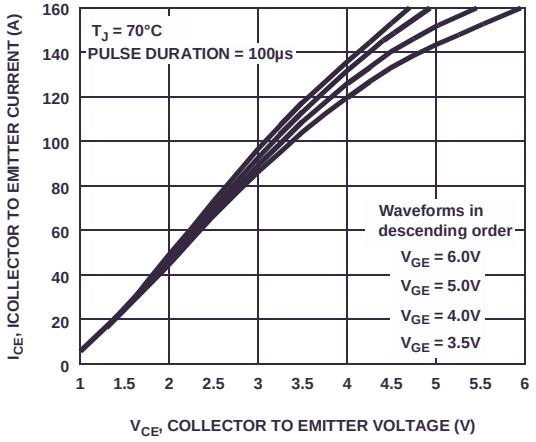



**Figure 3. Collector to Emitter On-State Voltage vs Collector Current**

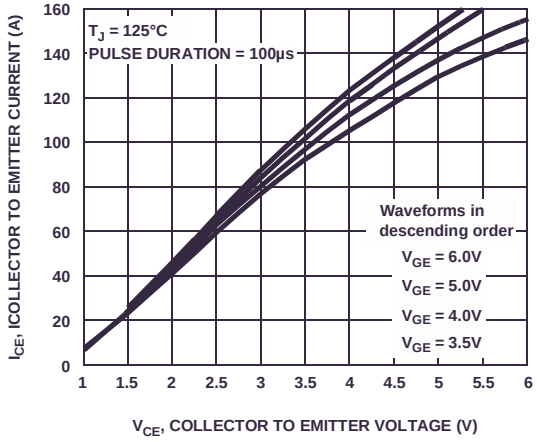



**Figure 4. Collector to Emitter On-State Voltage vs Collector Current**

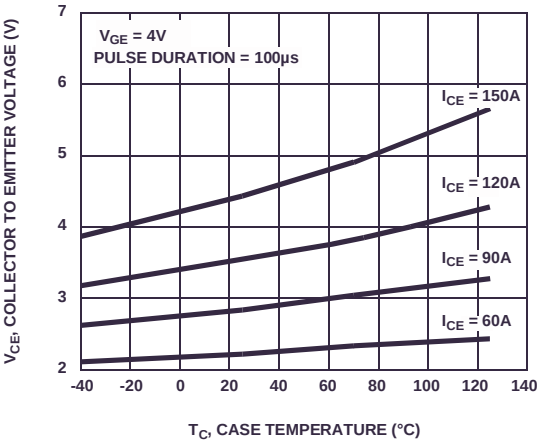



**Figure 5. Collector to Emitter Saturation Voltage vs Case Temperature**

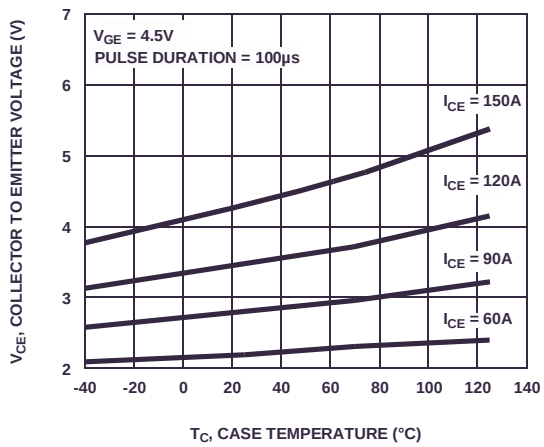



**Figure 6. Collector to Emitter Saturation Voltage vs Case Temperature**

## Typical Characteristics (Continued)

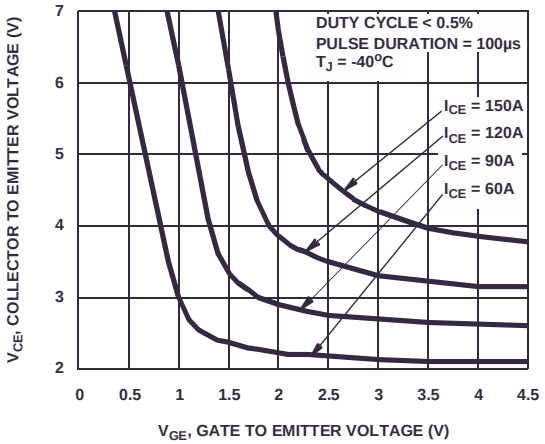



**Figure 7. Collector to Emitter On-State Voltage vs Gate to Emitter Voltage**

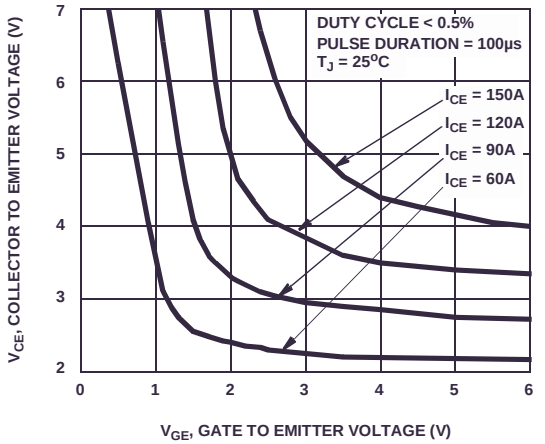



**Figure 8. Collector to Emitter On-State Voltage vs Gate to Emitter Voltage**

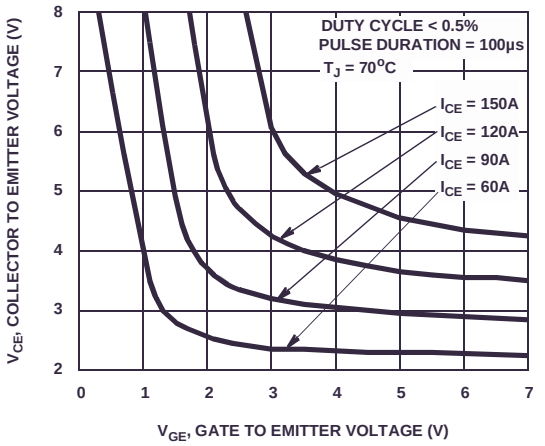



**Figure 9. Collector to Emitter On-State Voltage vs Gate to Emitter Voltage**

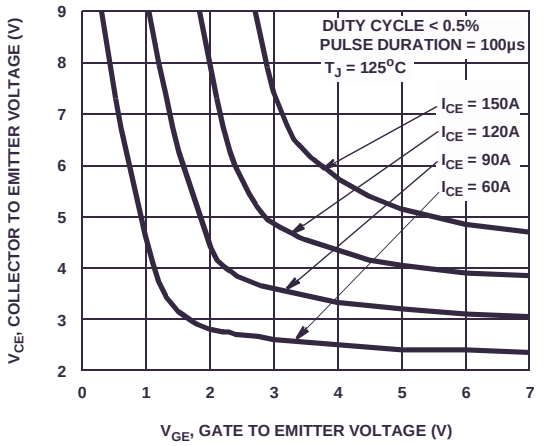



**Figure 10. Collector to Emitter On-State Voltage vs Gate to Emitter Voltage**

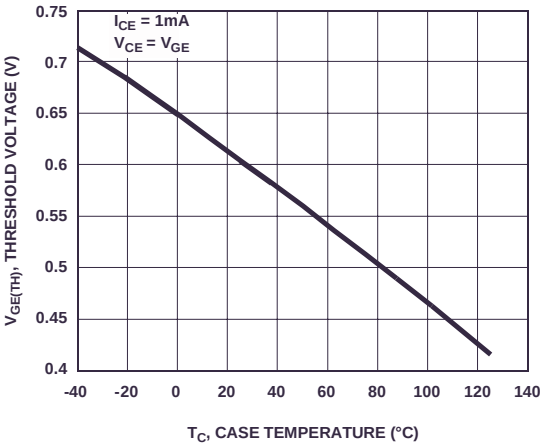



**Figure 11. Gate to Emitter Threshold Voltage vs Case Temperature**

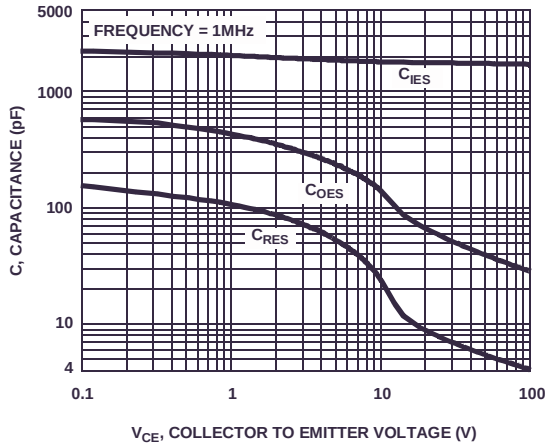



**Figure 12. Capacitance vs Collector to Emitter Voltage**

## Typical Characteristics (Continued)

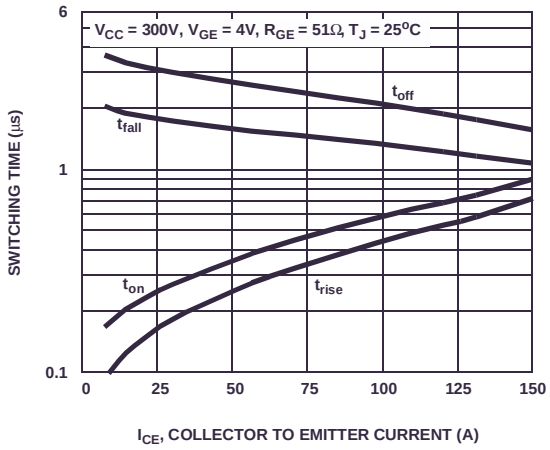



**Figure 13. Switching Time vs Collector Current**

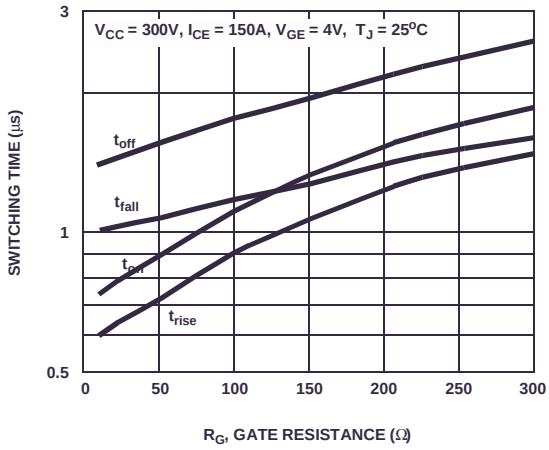



**Figure 14. Switching Time vs Gate Resistance**

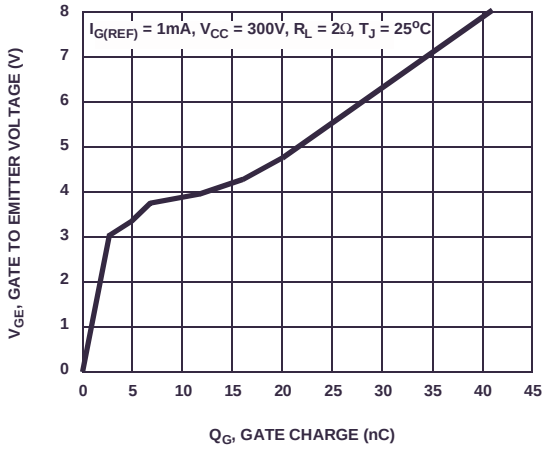



**Figure 15. Gate Charge**

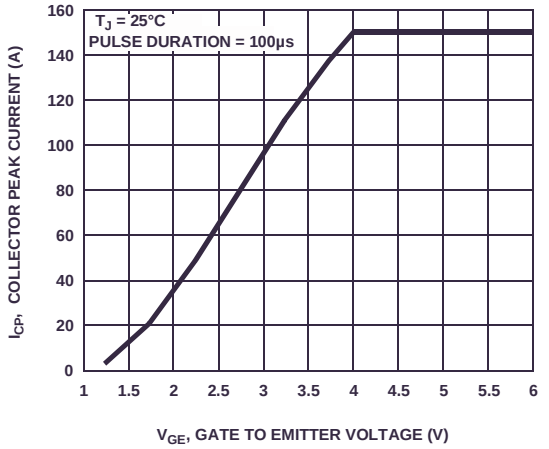



**Figure 16. Collector Current Limit vs Gate to Emitter Voltage**

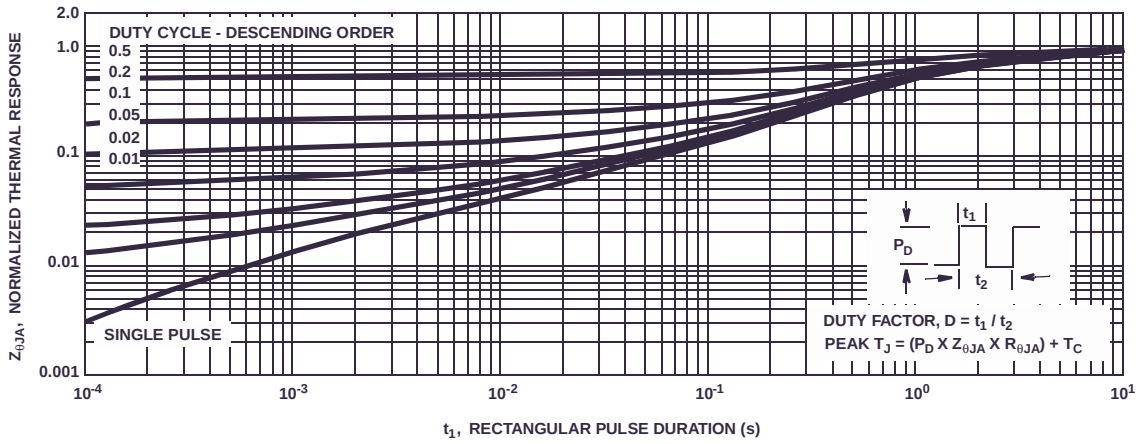



**Figure 17. Normalized Transient Thermal Impedance, Junction to Case**

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