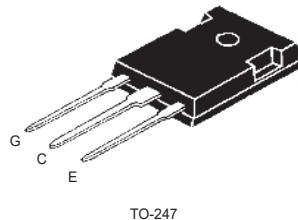
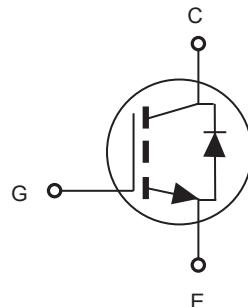


**650V 75A Insulated Gate Bipolar Transistors****FEATURES**

- $V_{CES} = 650V$ ,  $I_C = 75A$  ( $T_C=100^\circ C$ ) .
- Trench Gate and Field Stop Processes IGBT .
- Low switching power loss .
- Low switching surge and noise .
- Low EMI .



TO-247

**ABSOLUTE MAXIMUM VALUES**  $T_C = 25^\circ C$  unless otherwise noted

Parameter	Symbol	Limit	Units
Collector-to-Emitter Breakdown Voltage	$V_{CES}$	650	V
Gate-to-Emitter Voltage	$V_{GE}$	$\pm 20$	V
Continuous Collector Current @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	$I_C$	115 75	A
Pulsed Collector Current , tp limited by $T_{jmax}$	$I_{CM}$	300	A
Diode Continuous Forward Current @ $T_C = 25^\circ C$ @ $T_C = 100^\circ C$	$I_F$	115 75	A
Diode Maximum Forward Current	$I_{FM}$	300	A
IGBT Max. Power Dissipation	$P_D$	395	W
FWD Max. Power Dissipation		306	W
Operating Junction Temperature	$T_J$	-40 to 175	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ C$

**Thermal Characteristics**

Parameter	Symbol	Limit	Units
Thermal Resistance, Junction-to-Case for IGBT	$R_{\theta JC}$	0.38	$^\circ C/W$
Thermal Resistance, Junction-to-Case for Diode	$R_{\theta JD}$	0.49	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	29	$^\circ C/W$



# CEWG75N65B

## Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted

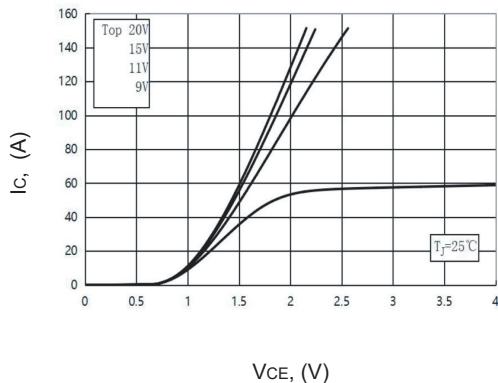
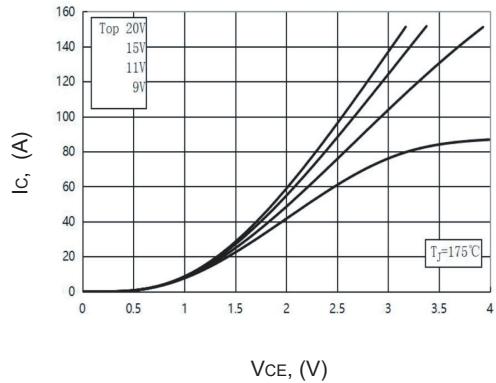
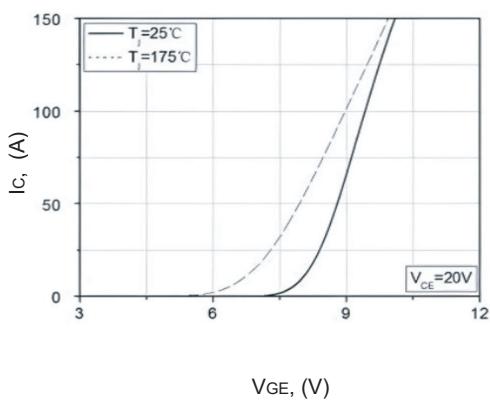
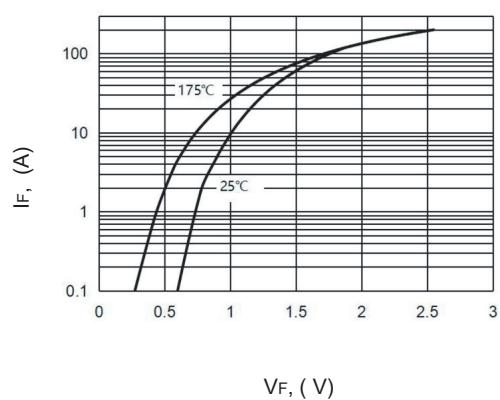
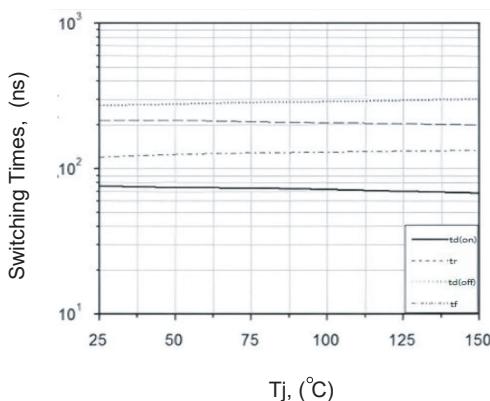
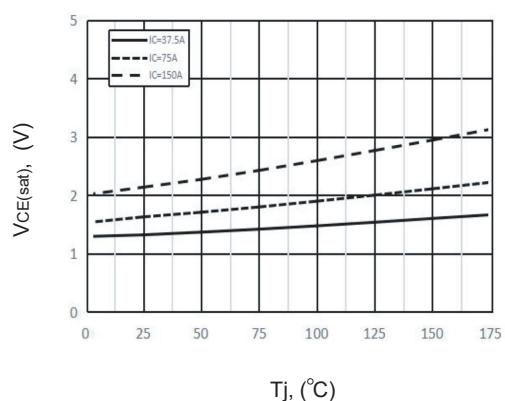
Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Collector-Emitter Breakdown Voltage	$\text{BV}_{\text{CES}}$	$V_{\text{GE}} = 0\text{V}, I_{\text{C}} = 0.5\text{mA}$	650			V
Zero Gate Voltage Collector Current	$I_{\text{CES}}$	$V_{\text{CE}} = 650\text{V}, V_{\text{GE}} = 0\text{V}$			200	uA
Gate Body Leakage Current, Forward	$I_{\text{GESF}}$	$V_{\text{GE}} = 20\text{V}, V_{\text{CE}} = 0\text{V}$			200	nA
Gate Body Leakage Current, Reverse	$I_{\text{GESR}}$	$V_{\text{GE}} = -20\text{V}, V_{\text{CE}} = 0\text{V}$			-200	nA
Gate Threshold Voltage	$V_{\text{GE}(\text{th})}$	$V_{\text{GE}} = V_{\text{CE}}, I_{\text{C}} = 250\mu\text{A}$	5		6.6	V
Collector-Emitter saturation Voltage	$V_{\text{CE}(\text{sat})}$	$V_{\text{GE}} = 20\text{V}, I_{\text{C}} = 75\text{A}$		1.82	2.25	V
Input Capacitance	$C_{\text{ies}}$	$V_{\text{CE}} = 30\text{V}, V_{\text{GE}} = 0\text{V}, f = 1\text{MHz}$		8910		pF
Output Capacitance	$C_{\text{oes}}$			200		pF
Reverse Transfer Capacitance	$C_{\text{res}}$			70		pF
Turn-On Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{CC}} = 400\text{V}, I_{\text{C}} = 75\text{A}, V_{\text{GE}} = 15\text{V}, R_{\text{GEN}} = 10\Omega$ Inductive Load $T_C = 25^\circ\text{C}$		82		ns
Turn-On Rise Time	$t_r$			30		ns
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$			145		ns
Turn-Off Fall Time	$t_f$			85		ns
Turn-On Switching Loss	$E_{\text{on}}$			5		mJ
Turn-Off Switching Loss	$E_{\text{off}}$			2.2		mJ
Turn-On Delay Time	$t_{\text{d}(\text{on})}$			75		ns
Turn-On Rise Time	$t_r$	$V_{\text{CC}} = 400\text{V}, I_{\text{C}} = 75\text{A}, V_{\text{GE}} = 15\text{V}, R_{\text{GEN}} = 10\Omega$ Inductive Load $T_C = 175^\circ\text{C}$		30		ns
Turn-Off Delay Time	$t_{\text{d}(\text{off})}$			165		ns
Turn-Off Fall Time	$t_f$			100		ns
Turn-On Switching Loss	$E_{\text{on}}$			5		mJ
Turn-Off Switching Loss	$E_{\text{off}}$			3		mJ
Total Gate Charge	$Q_g$	$V_{\text{CC}} = 520\text{V}, I_{\text{C}} = 75\text{A}, V_{\text{GE}} = 15\text{V}$		330		nC
Gate-Emitter Charge	$Q_{\text{ge}}$			90		nC
Gate-Collector Charge	$Q_{\text{gc}}$			117		nC

## Electrical Characteristics of Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
Diode Forward Voltage	$V_F$	$I_F = 75\text{A}$		1.5	3	V
Diode Reverse Recovery Time	$t_{rr}$	$I_F = 75\text{A}$ $dI_F / dt = 100\text{A} / \mu\text{s}$		68		ns
Diode peak Reverse Recovery Current	$I_{rr}$			15		A
Diode Reverse Recovery Charge	$Q_{rr}$			0.15		uC

Notes :

a. Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$ .

**TYPICAL PERFORMANCE CHARACTERISTICS**

**Figure 1. Output Characteristics**

**Figure 2. Output Characteristics**

**V<sub>GE</sub>, (V)**
**Figure 3. Typical Transfer Characteristics**

**V<sub>F</sub>, (V)**
**Figure 4. Typical  $V_F$  vs  $I_C$  Characteristics**

**T<sub>j</sub>, (°C)**
**Figure 5. Typical Switching Times vs  $T_j$  Characteristics**

**T<sub>j</sub>, (°C)**
**Figure 6. Typical  $V_{CE(sat)}$  vs  $T_j$  Characteristics**



# CEWG75N65B

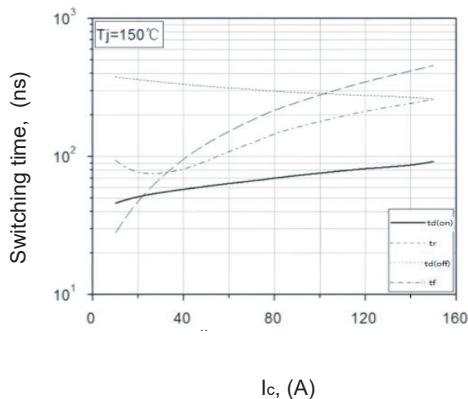


Figure 7.Typical Switching Times vs collector current

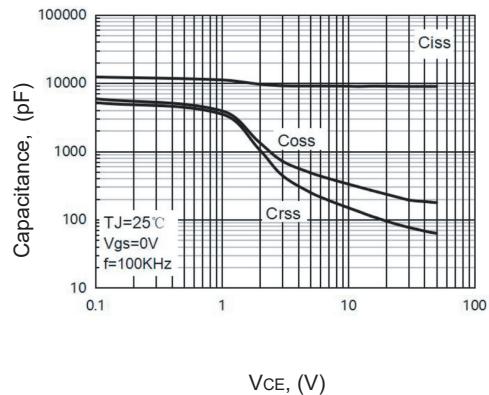
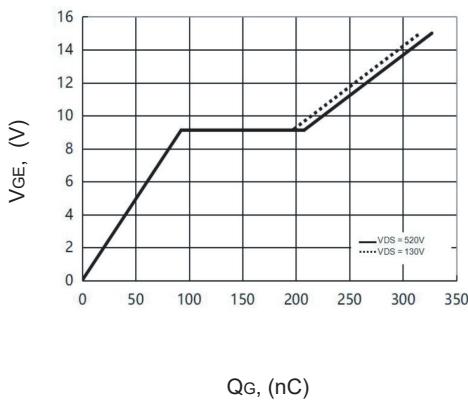
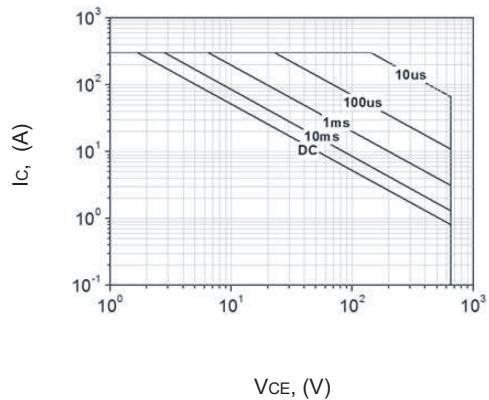


Figure 8.Capacitance Characteristics



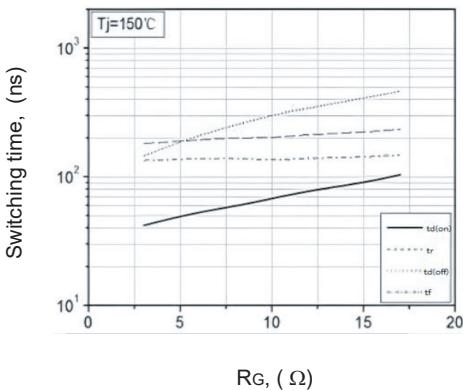
$Q_G$ , (nC)

Figure 9.Gate Charge Wave Form



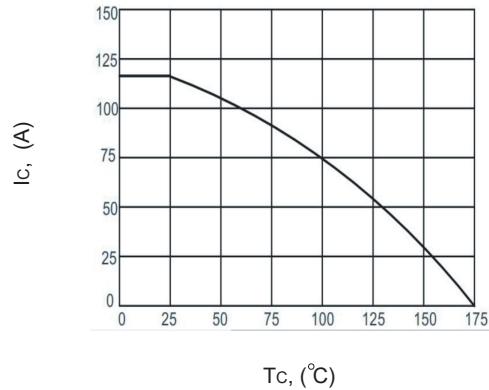
$V_{CE}$ , (V)

Figure 10.Forward Bias Safe Operating Area



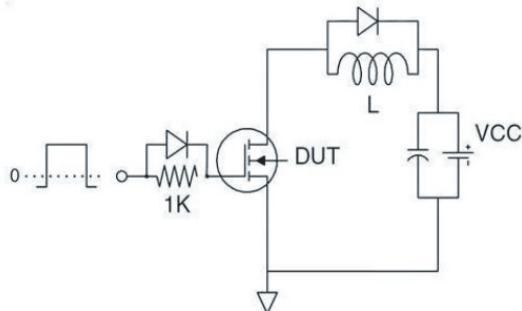
$R_G$ , (Ω)

Figure 11.Typical Switching Times vs Gate Resistances

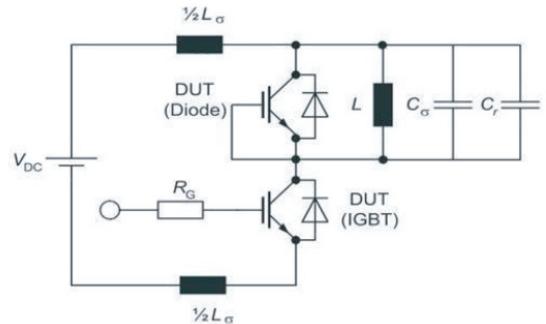


$T_C$ , (°C)

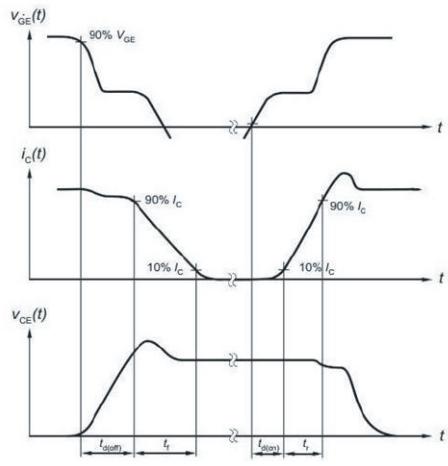
Figure 12.Collector current vs. case temperature

**TEST CIRCUIT**


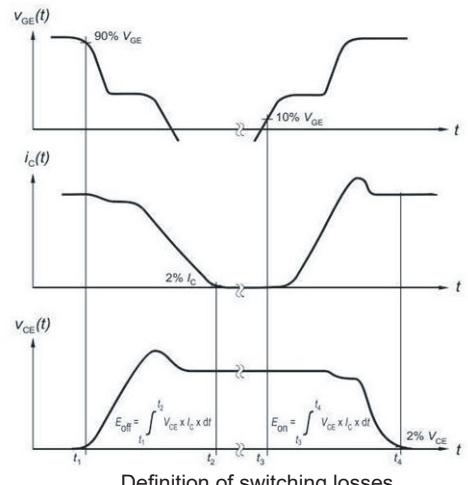
Gate Charge Test Circuit



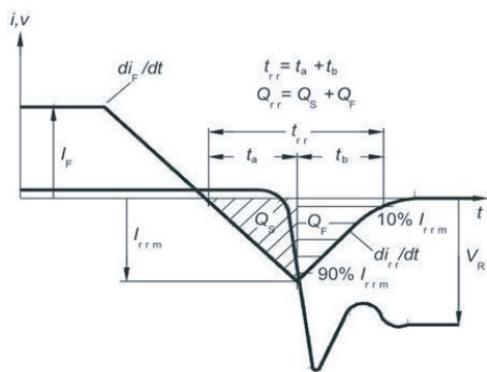
Switch Time Test Circuit

**SWITCHING CHARACTERISTICS**


Definition of switching times



Definition of switching losses



Definition of diode switching characteristics