

# Insulated Gate Bipolar Transistor

# 650V TRENCH GATE FIELD-STOP IGBT

### DESCRIPTION

The UTC **UTG70N65-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

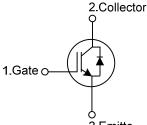
The UTC **UTG70N65-S** is suitable for the resonant or soft switching applications.

#### FEATURES

\* High switching speed

- \* High avalanche ruggedness
- \* Low saturation voltage: V<sub>CE(SAT).Typ.</sub>=1.75V @ I<sub>C</sub>=70A, V<sub>GE</sub>=15V (T<sub>C</sub> =25°C)

#### SYMBOL



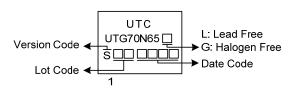
#### 3.Emitte

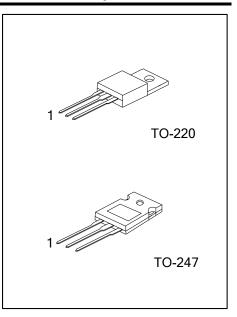
#### ORDERING INFORMATION

Ordering Number		Deskens	Pin Assignment			De alvie e	
Lead Free	Halogen Free	Package	1	2	3	Packing	
UTG70N65L-TA3-T	UTG70N65G-TA3-T	TO-220	G	С	ш	Tube	
UTG70N65L-T47-T	UTG70N65G-T47-T	TO-247	G	С	ш	Tube	
Note: Pin Assignment: G: Gate C: Collector E: Emitter							

UTG70N65G-TA3-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) TA3: TO-220, T47: TO-247
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

#### MARKING





PARAMETER		SYMBOL	RATINGS	UNIT	
Collector-Emitter Voltage		V <sub>CES</sub>	650	V	
Gate-Emitter Voltage			±20	V	
Transient Gate-emitter voltage ( <i>t</i> p < 5 ms)		V <sub>GES</sub>	±25	V	
Continuous Collector Current	T <sub>C</sub> =25°C		140	А	
Continuous Collector Current	T <sub>C</sub> =100°C	lc	70	А	
Collector Current Pulsed (Note 1)		Ісм	280	А	
Diode Forward Current	T <sub>C</sub> =25°C	lF	140	А	
	T <sub>C</sub> =100°C		70	А	
Short Circuit Withstand Time					
V <sub>GE</sub> = 15V, V <sub>CC</sub> ≤ 200V		t <sub>sc</sub>	3		
Allowed number of short circuits < 1000				μs	
Time between short circuits: ≥1.0s					
<i>T</i> <sub>VJ</sub> = 25°C					
	TO-220	_	125	W	
Power Dissipation (T <sub>c</sub> =25°C)	TO-247 PD 310 W	W			
Operating Junction Temperature		TJ	-40 ~ +150	°C	
Storage Temperature Range		Tstg	-55 ~ +150	°C	

#### ■ ABSOLUTE MAXIMUM RATINGS (T<sub>A</sub>=25°C, unless otherwise noted)

 Notes: 1. Absolute maximum ratings are stress ratings only and functional device operation is not implied. Absolute maximum ratings are those values beyond which the device could be permanently damaged.
2. Pulse width limited by maximum junction temperature.

#### THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
hum attions to Open a	TO-220	0	1.0	°C/W
Junction to Case	TO-247	θις	0.4	°C/W

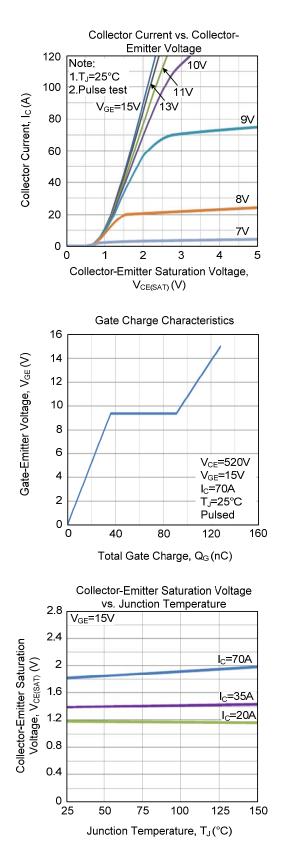


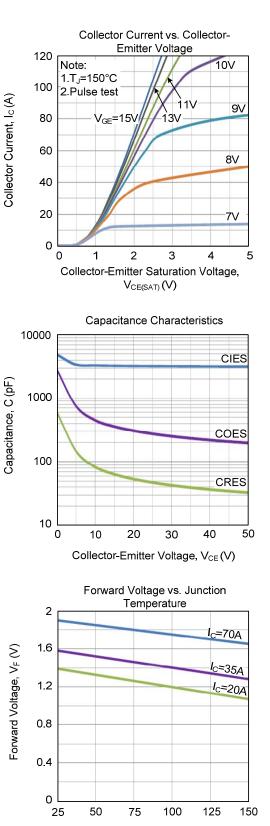
### ■ ELECTRICAL CHARACTERISTICS (Tc=25°C, unless otherwise noted)

PARAMETER	SYMBOL	L TEST CONDITIONS		MIN	TYP	MAX	UNIT
Off Characteristics							
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>			650			V
Collector Cut-Off Current	ICES	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V				5	μA
G-E Leakage Current	I <sub>GES</sub>	$V_{CE}=0V, V_{GE}=\pm 20V$				±400	nA
On Characteristics							
Gate to Emitter Threshold Voltage	V <sub>GE(TH)</sub>	I <sub>C</sub> =250µA, V <sub>CE</sub> =V <sub>GE</sub>	I <sub>C</sub> =250µA, V <sub>CE</sub> =V <sub>GE</sub>			6.5	V
Collector to Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =70A, V <sub>GE</sub> =15V	T <sub>C</sub> =25°C		1.75	2.1	V
	· · · /	T <sub>c</sub> =125°			2.0		V
Dynamic Characteristics	1 _	i		i		i	
Input Capacitance	CIES	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz			3220		pF
Output Capacitance	COES				272		pF
Reverse Transfer Capacitance	CRES			44.6		pF	
Switching Characteristics						-	
Total Gate Charge	Q <sub>G</sub>	V <sub>CE</sub> =520V, I <sub>C</sub> =70A, V <sub>GE</sub> =15V			125.7		nC
Gate-Emitter Charge	$Q_{GE}$				34		nC
Gate-Collector Charge	Q <sub>GC</sub>				58.3		nC
Turn-On Delay Time	t <sub>DON)</sub>				21		ns
Rise Time	t <sub>R</sub>				75		ns
Turn-Off Delay Time	t <sub>DOFF)</sub>	V <sub>CC</sub> =400V, I <sub>C</sub> =70A, R <sub>G</sub> =5Ω, V <sub>GE</sub> =0~15V, L=500uH			113		ns
Fall Time	t⊧				55		ns
Turn-On Switching Loss	Eon				2.97		mJ
Turn-Off Switching Loss	EOFF			2.45		mJ	
SOURCE- DRAIN DIODE RATINGS AN	D CHARAC	TERISTICS					
Forward Voltage Drop	VF	I <sub>F</sub> =70A			1.5	3.0	V
Reverse Recovery Time	trr	−I <sub>F</sub> =70A, dl/dt=100A/μS, V <sub>CC</sub> =400V			41.5		ns
Reverse Recovery Charge	Qrr				201.3		nC



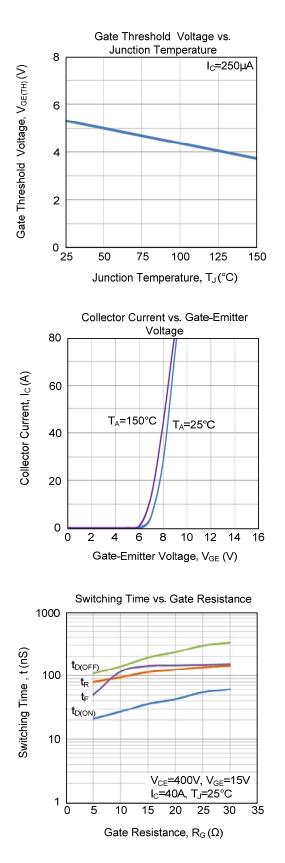
### TYPICAL CHARACTERISTICS

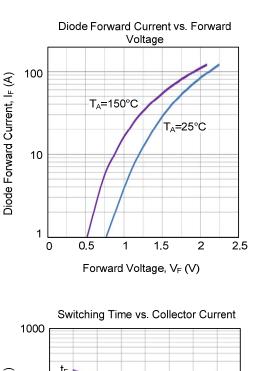


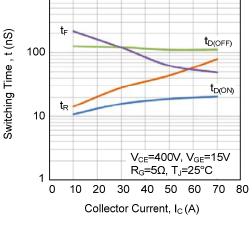




### ■ TYPICAL CHARACTERISTICS (Cont.)





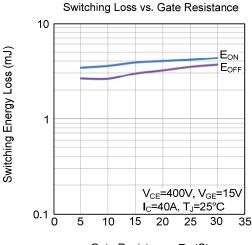


Switching Loss vs. Collector Current 10 1 EOFF Eon V<sub>CE</sub>=400V, V<sub>GE</sub>=15V  $R_G=5\Omega$ ,  $T_J=25^{\circ}C$ 0.1 ō 10 20 30 50 40 60 70 80 Collector Current,  $I_C(A)$ 

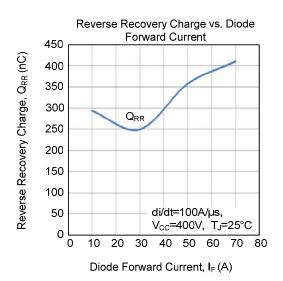
Switching Energy Loss (mJ)

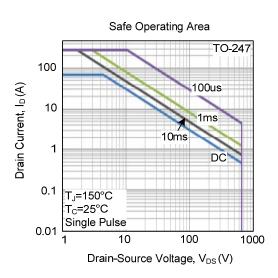


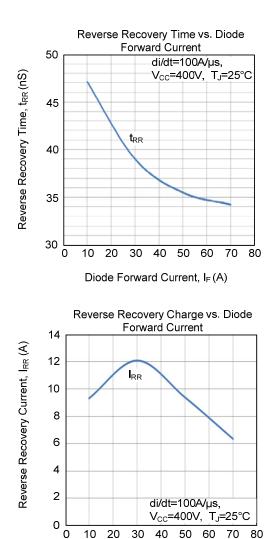
## ■ TYPICAL CHARACTERISTICS (Cont.)



Gate Resistance,  $R_G(\Omega)$ 







Diode Forward Current,  $I_F(A)$ 

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