



## UTG16N65-S

### Insulated Gate Bipolar Transistor

## 650V TRENCH GATE FIELD-STOP IGBT

### DESCRIPTION

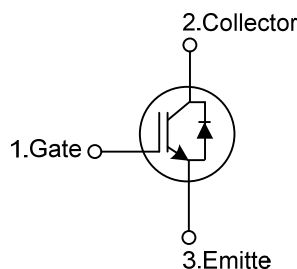
The UTC **UTG16N65-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG16N65-S** is suitable for the resonant or soft switching applications.

### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT), Typ.} = 1.65V @ I_C = 16A, V_{GE} = 15V$  ( $T_C = 25^\circ C$ )

### SYMBOL

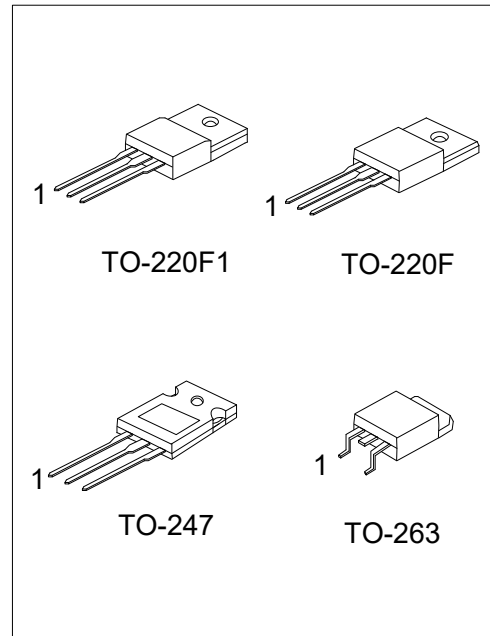


### ORDERING INFORMATION

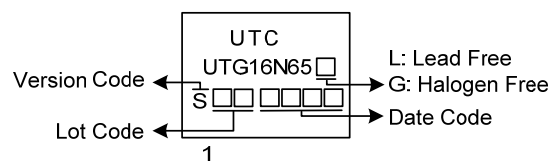
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG16N65L-S-TF1-T	UTG16N65G-S-TF1-T	TO-220F1	G	C	E	Tube
UTG16N65L-S-TF3-T	UTG16N65G-S-TF3-T	TO-220F	G	C	E	Tube
UTG16N65L-S-T47-T	UTG16N65G-S-T47-T	TO-247	G	C	E	Tube
UTG16N65L-S-TQ2-T	UTG16N65G-S-TQ2-T	TO-263	G	C	E	Tube
UTG16N65L-S-TQ2-R	UTG16N65G-S-TQ2-R	TO-263	G	C	E	Tape Reel

Note: Pin Assignment: G: Gate C: Collector E: Emitter

UTG16N65G-S-TF1-T	(1)Packing Type (2)Package Type (3)Version Code (4)Green Package	(1) T: Tube, R: Tape Reel (2) TF1: TO-220F1, TF3: TO-220F, T47: TO-247 TQ2: TO-263 (3) Version S (4) G: Halogen Free and Lead Free, L: Lead Free
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### ■ MARKING



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		$V_{CES}$	650	V
Gate-Emitter Voltage		$V_{GES}$	$\pm 20$	V
Transient Gate-emitter voltage ( $t_p < 5\text{ ms}$ )			$\pm 25$	V
Continuous Collector Current	$T_C=25^{\circ}\text{C}$	$I_C$	32	A
	$T_C=100^{\circ}\text{C}$		16	A
Collector Current Pulsed (Note 1)		$I_{CM}$	64	A
Diode Forward Current	$T_C=25^{\circ}\text{C}$	$I_F$	32	A
	$T_C=100^{\circ}\text{C}$		16	A
Short Circuit Withstand Time $V_{GE} = 15\text{V}$ , $V_{CC} \leq 200\text{V}$ Allowed number of short circuits $< 1000$ Time between short circuits: $\geq 1.0\text{s}$ $T_{VJ}= 25^{\circ}\text{C}$		$t_{SC}$	3	$\mu\text{s}$
Power Dissipation ( $T_C=25^{\circ}\text{C}$ )	TO-220F	$P_D$	33	W
	TO-220F 1			
	TO-247		285	W
	TO-263		95	W
Operating Junction Temperature		$T_J$	-40 ~ +150	$^{\circ}\text{C}$
Storage Temperature Range		$T_{STG}$	-55 ~ +150	$^{\circ}\text{C}$

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
Junction to Case	TO-220F	$\theta_{JC}$	3.79	$^\circ\text{C/W}$
	TO-220F 1			
	TO-247		0.44	$^\circ\text{C/W}$
	TO-263		1.31	$^\circ\text{C/W}$

■ ELECTRICAL CHARACTERISTICS (T<sub>C</sub>=25°C, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Off Characteristics							
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>			650			V
Collector Cut-Off Current	I <sub>CES</sub>	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V				5	μA
G-E Leakage Current	I <sub>GES</sub>	V <sub>CE</sub> =0V, V <sub>GE</sub> =±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>		4.5		6.5	V
Collector to Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =16A, V <sub>GE</sub> =15V	T <sub>C</sub> =25°C		1.65	2.1	V
			T <sub>C</sub> =125°C		2.0		V
Dynamic Characteristics							
Input Capacitance	C <sub>IES</sub>	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz			770		pF
Output Capacitance	C <sub>OES</sub>				64.6		pF
Reverse Transfer Capacitance	C <sub>RES</sub>				10.4		pF
Switching Characteristics							
Total Gate Charge	Q <sub>G</sub>	V <sub>CE</sub> =520V, I <sub>C</sub> =16A, V <sub>GE</sub> =15V			47.5		nC
Gate-Emitter Charge	Q <sub>GE</sub>				17.5		nC
Gate-Collector Charge	Q <sub>GC</sub>				18.4		nC
Turn-On Delay Time	t <sub>DON</sub>	V <sub>CC</sub> =400V, I <sub>C</sub> =16A, R <sub>G</sub> =5Ω, V <sub>GE</sub> =0~15V, L=1000uH			7.6		ns
Rise Time	t <sub>R</sub>				16.6		ns
Turn-Off Delay Time	t <sub>DOFF</sub>				29.9		ns
Fall Time	t <sub>F</sub>				180.1		ns
Turn-On Switching Loss	E <sub>ON</sub>				0.53		mJ
Turn-Off Switching Loss	E <sub>OFF</sub>				0.49		mJ
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Forward Voltage Drop	V <sub>F</sub>	I <sub>F</sub> =16A				3.0	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =16A, dI/dt=100A/μS, V <sub>CC</sub> =400V			42.9		ns
Reverse Recovery Charge	Q <sub>rr</sub>				86.1		nC

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