



## UTG28N65-S

Preliminary

Insulated Gate Bipolar Transistor

### 650V TRENCH GATE FIELD-STOP IGBT

#### DESCRIPTION

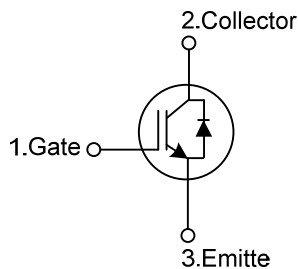
The UTC **UTG28N65-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG28N65-S** is suitable for the resonant or soft switching applications.

#### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT), Typ.} = 1.65V @ I_C = 28A, V_{GE} = 15V$  ( $T_C = 25^\circ C$ )

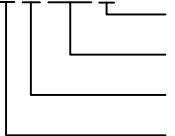
#### SYMBOL

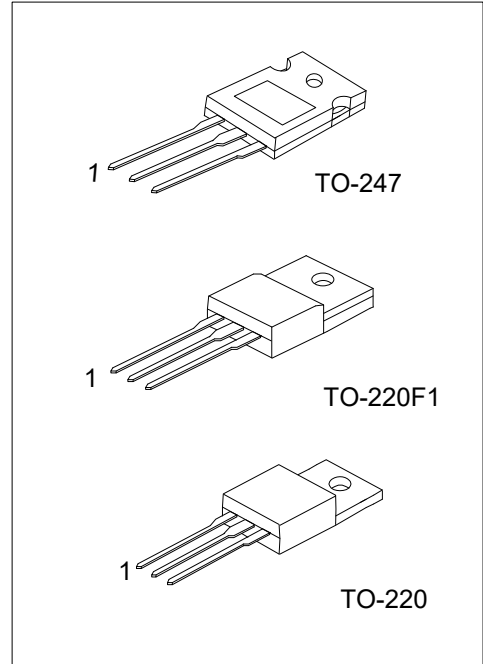


#### ORDERING INFORMATION

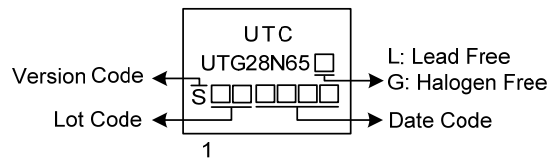
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG28N65L-S-TA3-T	UTG28N65G-S-TA3-T	TO-220	G	C	E	Tube
UTG28N65L-S-TF1-T	UTG28N65G-S-TF1-T	TO-220F1	G	C	E	Tube
UTG28N65L-S-T47-T	UTG28N65G-S-T47-T	TO-247	G	C	E	Tube

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

<p>UTG28N65G-S-TA3-T</p> 		(1) T: Tube (2) TA3: TO-220, TF1: TO-220F1, T47: TO-247 (3) Version S (4) G: Halogen Free and Lead Free, L: Lead Free
--	--	--



### ■ 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	$T_C=25^{\circ}\text{C}$	$I_C$	56	A
	$T_C=100^{\circ}\text{C}$		28	A
Collector Current Pulsed (Note 1)		$I_{CM}$	112	A
Diode Forward Current	$T_C=25^{\circ}\text{C}$	$I_F$	56	A
	$T_C=100^{\circ}\text{C}$		28	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-220	$P_D$	105	W
	TO-220F1		35	W
	TO-247		290	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-220	$\theta_{JC}$	1.19	$^\circ\text{C/W}$
	TO-220F1		3.57	$^\circ\text{C/W}$
	TO-247		0.43	$^\circ\text{C/W}$

■ 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>		2.5		6.5	V
Collector to Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =28A, 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			1550		pF
Output Capacitance	C <sub>OES</sub>				108		pF
Reverse Transfer Capacitance	C <sub>RES</sub>				19.7		pF
Switching Characteristics							
Total Gate Charge	Q <sub>G</sub>	V <sub>CE</sub> =520V, I <sub>C</sub> =28A, V <sub>GE</sub> =15V			87.3		nC
Gate-Emitter Charge	Q <sub>GE</sub>				18		nC
Gate-Collector Charge	Q <sub>GC</sub>				31.2		nC
Turn-On Delay Time	t <sub>DON</sub>	V <sub>CC</sub> =400V, I <sub>C</sub> =28A, R <sub>G</sub> =5Ω, V <sub>GE</sub> =0~15V, L=1000uH			19.1		ns
Rise Time	t <sub>tr</sub>				19		ns
Turn-Off Delay Time	t <sub>DOFF</sub>				73.4		ns
Fall Time	t <sub>f</sub>				76.2		ns
Turn-On Switching Loss	E <sub>ON</sub>				0.36		mJ
Turn-Off Switching Loss	E <sub>OFF</sub>				0.78		mJ
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Forward Voltage Drop	V <sub>F</sub>	I <sub>F</sub> =28A				3.0	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =28A, dI/dt=100A/μS, V <sub>CC</sub> =400V			51		ns
Reverse Recovery Charge	Q <sub>rr</sub>				348.5		nC

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. UTC reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.