



## UTG40N65-S

*Insulated Gate Bipolar Transistor*

### 650V TRENCH GATE FIELD-STOP IGBT

#### DESCRIPTION

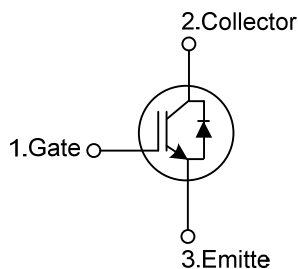
The UTC **UTG40N65-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG40N65-S** is suitable for the resonant or soft switching applications.

#### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT), Typ.} = 1.65V @ I_C = 40A, V_{GE} = 15V$  ( $T_C = 25^\circ C$ )

#### SYMBOL



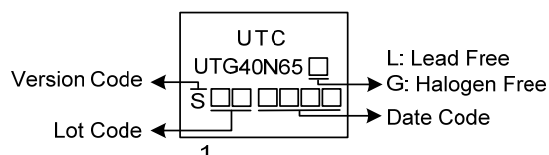
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG40N65L-T47-T	UTG40N65G-T47-T	TO-247	G	C	E	Tube
UTG40N65L-T3P-T	UTG40N65G-T3P-T	TO-3P	G	C	E	Tube
UTG40N65L-T3N-T	UTG40N65G-T3N-T	TO-3PN	G	C	E	Tube

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

UTG40N65G-T47-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) T47: TO-247, T3P: TO-3P, T3N: TO-3PN
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free

#### MARKING



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

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	$T_C=25^{\circ}\text{C}$	$I_C$	80	A
	$T_C=100^{\circ}\text{C}$		40	A
Collector Current Pulsed (Note 1)		$I_{CM}$	160	A
Diode Forward Current	$T_C=25^{\circ}\text{C}$	$I_F$	80	A
	$T_C=100^{\circ}\text{C}$		40	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-247	$P_D$	298	W
	TO-3P/TO-3PN		320	W
Operating Junction Temperature		$T_J$	$-40 \sim +150$	$^{\circ}\text{C}$
Storage Temperature Range		$T_{STG}$	$-55 \sim +150$	$^{\circ}\text{C}$

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.

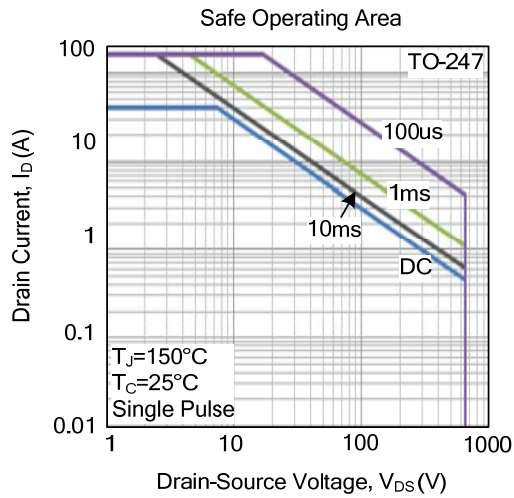
■ THERMAL DATA

PARAMETER		SYMBOL	RATING	UNIT
Junction to Case	TO-247	$\theta_{JC}$	0.41	$^{\circ}\text{C/W}$
	TO-3P/TO-3PN		0.39	$^{\circ}\text{C/W}$

■ 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> =40A, 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		2590		pF
Output Capacitance	C <sub>OES</sub>			146.3		pF
Reverse Transfer Capacitance	C <sub>RES</sub>			35.9		pF
Switching Characteristics						
Total Gate Charge	Q <sub>G</sub>	V <sub>CE</sub> =520V, I <sub>C</sub> =40A, V <sub>GE</sub> =15V		134.7		nC
Gate-Emitter Charge	Q <sub>GE</sub>			23.4		nC
Gate-Collector Charge	Q <sub>GC</sub>			48.6		nC
Turn-On Delay Time	t <sub>DON</sub>	V <sub>CC</sub> =400V, I <sub>C</sub> =40A, R <sub>G</sub> =5Ω, V <sub>GE</sub> =0~15V, L=500uH		12.8		ns
Rise Time	t <sub>R</sub>			27.1		ns
Turn-Off Delay Time	t <sub>DOFF</sub>			113.4		ns
Fall Time	t <sub>F</sub>			61.2		ns
Turn-On Switching Loss	E <sub>ON</sub>			0.92		mJ
Turn-Off Switching Loss	E <sub>OFF</sub>			1.17		mJ
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS						
Forward Voltage Drop	V <sub>F</sub>	I <sub>F</sub> =40A		2.0	3.0	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =40A, dI/dt=100A/μS, V <sub>CC</sub> =400V		30		ns
Reverse Recovery Charge	Q <sub>rr</sub>			615		nC

### ■ TYPICAL CHARACTERISTICS



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