



## UTG40N65FQ-S

Preliminary

Insulated Gate Bipolar Transistor

### 650V TRENCH GATE FIELD-STOP IGBT

#### DESCRIPTION

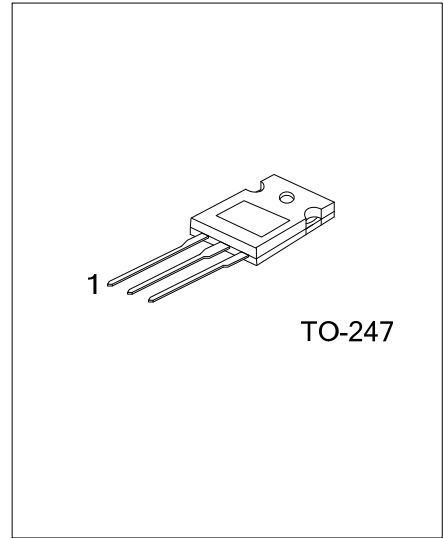
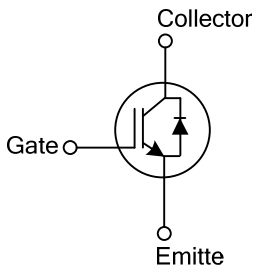
The UTC **UTG40N65FQ-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG40N65FQ-S** is suitable for the resonant or soft switching applications.

#### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT),Typ.}=1.4V @ I_C=40A, V_{GE}=15V$  ( $T_C = 25^\circ C$ )

#### SYMBOL



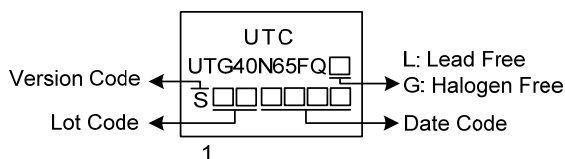
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG40N65FQL-S-T47-T	UTG40N65FQG-S-T47-T	TO-247	G	C	E	Tube

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

<p>UTG40N65FQG-S-T47-T</p>	<p>(1) T: Tube (2) T47: TO-247 (3) Version S (4) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT	
Collector-Emitter Voltage	V <sub>CE(S)</sub>	650	V	
Gate-Emitter Voltage	V <sub>GES</sub>	±20	V	
Transient Gate-emitter voltage (t <sub>p</sub> < 5 ms)		±25	V	
Continuous Collector Current	I <sub>C</sub>	T <sub>C</sub> =25°C	80	A
		T <sub>C</sub> =100°C	40	A
Collector Current Pulsed (Note 1)	I <sub>CM</sub>	80	A	
Diode Forward Current	I <sub>F</sub>	T <sub>C</sub> =25°C	40	A
		T <sub>C</sub> =100°C	20	A
Short Circuit Withstand Time V <sub>GE</sub> = 15V, V <sub>CC</sub> ≤ 200V Allowed number of short circuits < 1000 Time between short circuits: ≥1.0s T <sub>VJ</sub> = 25°C	t <sub>SC</sub>	10	μs	
Power Dissipation (T <sub>C</sub> =25°C)	P <sub>D</sub>	298	W	
Operating Junction Temperature	T <sub>J</sub>	-40 ~ +150	°C	
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°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	θ <sub>JC</sub>	0.41	°C/W

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>Off Characteristics</b>							
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	
<b>On Characteristics</b>							
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		7.5	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	1.4	2.1	V	
			T <sub>C</sub> =125°C	1.8		V	
<b>Dynamic Characteristics</b>							
Input Capacitance	C <sub>IES</sub>	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz		2.66		nF	
Output Capacitance	C <sub>OES</sub>			159		pF	
Reverse Transfer Capacitance	C <sub>RES</sub>			41		pF	
<b>Switching Characteristics</b>							
Total Gate Charge	Q <sub>G</sub>	V <sub>CE</sub> =520V, I <sub>C</sub> =40A, V <sub>GE</sub> =15V		119		nC	
Gate-Emitter Charge	Q <sub>GE</sub>			31		nC	
Gate-Collector Charge	Q <sub>GC</sub>			58		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		20		ns	
Rise Time	t <sub>R</sub>			77		ns	
Turn-Off Delay Time	t <sub>DOFF)</sub>			90		ns	
Fall Time	t <sub>F</sub>			63		ns	
Turn-On Switching Loss	E <sub>ON</sub>				3		mJ
Turn-Off Switching Loss	E <sub>OFF</sub>				1.7		mJ
<b>SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS</b>							
Forward Voltage Drop	V <sub>F</sub>		I <sub>F</sub> =20A			2.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =20A, dI/dt=100A/μS, V <sub>CC</sub> =400V		77		ns	
Reverse Recovery Charge	Q <sub>rr</sub>				1.67		μC

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