



## UTG60N65FQ-S

*Insulated Gate Bipolar Transistor*

### 650V TRENCH GATE FIELD-STOP IGBT

#### DESCRIPTION

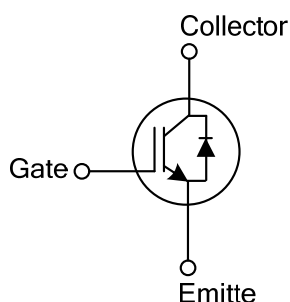
The UTC **UTG60N65FQ-S** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG60N65FQ-S** is suitable for the resonant or soft switching applications.

#### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT), Typ.} = 1.64V @ I_C = 60A, V_{GE} = 15V (T_C = 25^{\circ}C)$

#### SYMBOL

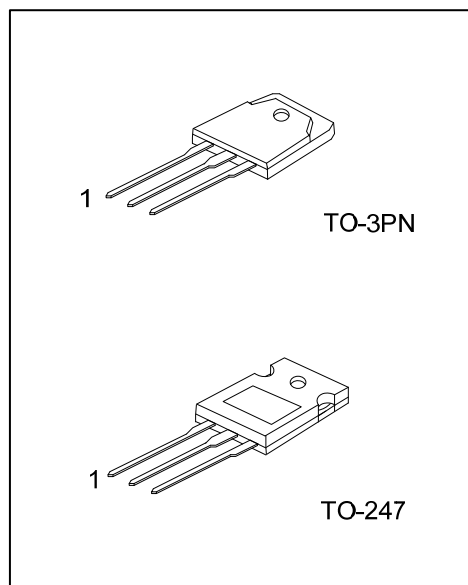


#### ORDERING INFORMATION

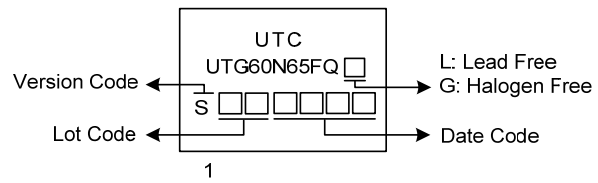
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG60N65FQL-S-T47-T	UTG60N65FQG-S-T47-T	TO-247	G	C	E	Tube
UTG60N65FQL-S-T3N-T	UTG60N65FQG-S-T3N-T	TO-3PN	G	C	E	Tube

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

UTG60N65FQG-S-T47-T		(1) Packing Type	(1) T: Tube
		(2) Package Type	(2) T47: TO-247, T3N: TO-3PN
		(3) Version Code	(3) Version S
		(4) Green Package	(4) 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	$I_C$	$T_C=25^{\circ}\text{C}$	A
		$T_C=100^{\circ}\text{C}$	A
Collector Current Pulsed (Note 1)	$I_{CM}$	240	A
Diode Forward Current	$I_F$	$T_C=25^{\circ}\text{C}$	A
		$T_C=100^{\circ}\text{C}$	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 ( $T_C=25^{\circ}\text{C}$ )	$P_D$	TO-247	W
		TO-3P	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	$\theta_{JC}$	TO-247	$^{\circ}\text{C/W}$
		TO-3P	$^{\circ}\text{C/W}$

■ 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	$BV_{CES}$			650			V
Collector Cut-Off Current	$I_{CES}$	$V_{CE}=650V, V_{GE}=0V$				5	$\mu A$
G-E Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$				$\pm 400$	nA
On Characteristics							
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=250\mu A, V_{CE}=V_{GE}$		4.5		7.5	V
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=60A, V_{GE}=15V$	$T_C=25^{\circ}C$		1.64	2.1	V
			$T_C=125^{\circ}C$		2.0		V
Dynamic Characteristics							
Input Capacitance	$C_{IES}$	$V_{CE}=25V, V_{GE}=0V, f=1MHz$			2690		pF
Output Capacitance	$C_{OES}$				194		pF
Reverse Transfer Capacitance	$C_{RES}$				38.8		pF
Switching Characteristics							
Total Gate Charge	$Q_G$	$V_{CE}=600V, I_C=60A, V_{GE}=15V$			121		nC
Gate-Emitter Charge	$Q_{GE}$				32.8		nC
Gate-Collector Charge	$Q_{GC}$				56.8		nC
Turn-On Delay Time	$t_{DON}$	$V_{CC}=600V, I_C=60A, R_G=5\Omega, V_{GE}=0\sim 15V, L=500uH$			19		ns
Rise Time	$t_R$				73		ns
Turn-Off Delay Time	$t_{DOFF}$				89		ns
Fall Time	$t_F$				119		ns
Turn-On Switching Loss	$E_{ON}$				3.02		mJ
Turn-Off Switching Loss	$E_{OFF}$				1.7		mJ
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Forward Voltage Drop	$V_F$	$I_F=30A$				2.5	V
Reverse Recovery Time	$t_{rr}$	$I_F=60A, di/dt=100A/\mu S, V_{CC}=400V$			31.7		ns
Reverse Recovery Charge	$Q_{rr}$				127		nC

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