



## UTG40N65HLX1

Preliminary

*Insulated Gate Bipolar Transistor*

### 650V TRENCH GATE FIELD-STOP IGBT

#### DESCRIPTION

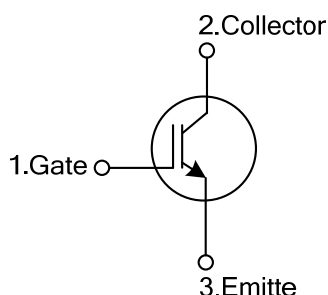
The UTC **UTG40N65HLX1** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG40N65HLX1** is suitable for the resonant or soft switching applications.

#### FEATURES

- \* High switching speed
- \* High avalanche ruggedness
- \* Low saturation voltage:  $V_{CE(SAT), Typ.} = 1.6V @ I_C=40A, V_{GE}=15V$  ( $T_C = 25^{\circ}C$ )

#### SYMBOL

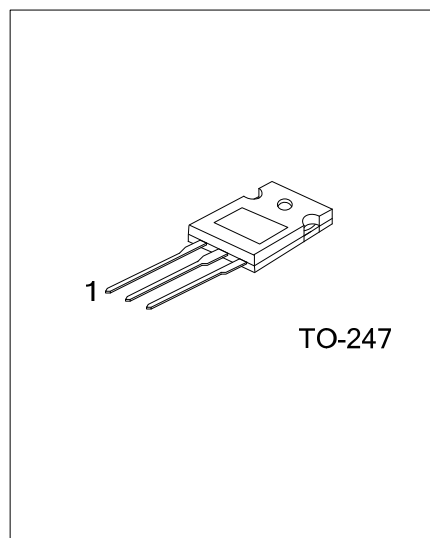


#### ORDERING INFORMATION

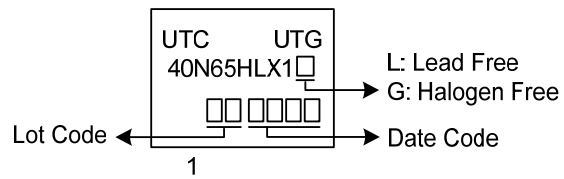
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG40N65HLX1L-T47-T	UTG40N65HLX1G-T47-T	TO-247	G	C	E	Tube

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

UTG40N65HLX1G-T47-T	(1)Packing Type	(1) T: Tube
	(2)Package Type	(2) T47: TO-247
	(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free



### ■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V <sub>CES</sub>	650	V
Gate-Emitter Voltage		V <sub>GES</sub>	±20	V
Transient Gate-Emitter Voltage (tp < 5 ms)			±25	V
Continuous Collector Current	T <sub>C</sub> =25°C	I <sub>C</sub>	80	A
	T <sub>C</sub> =100°C		40	A
Collector Current Pulsed (Note 1)		I <sub>CM</sub>	160	A
Diode Forward Current	T <sub>C</sub> =25°C	I <sub>F</sub>	80	A
	T <sub>C</sub> =100°C		40	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>	8	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 specified)

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>		3.5		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		1.6	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			2010		pF
Output Capacitance	C <sub>OES</sub>				129		pF
Reverse Transfer Capacitance	C <sub>RES</sub>				37		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			94		nC
Gate-Emitter Charge	Q <sub>GE</sub>				28		nC
Gate-Collector Charge	Q <sub>GC</sub>				46		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=500μH			16		ns
Rise Time	t <sub>R</sub>				33		ns
Turn-Off Delay Time	t <sub>DOFF</sub>				77		ns
Fall Time	t <sub>F</sub>				46		ns
Turn-On Switching Loss	E <sub>ON</sub>				2		mJ
Turn-Off Switching Loss	E <sub>OFF</sub>				1		mJ

### ■ TEST CIRCUIT AND WAVEFORMS

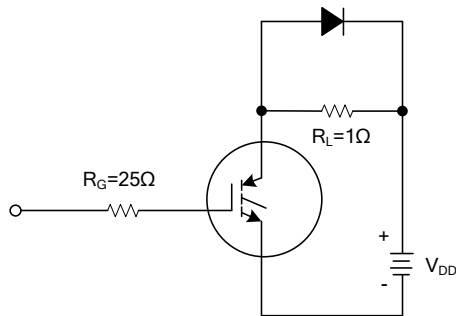


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

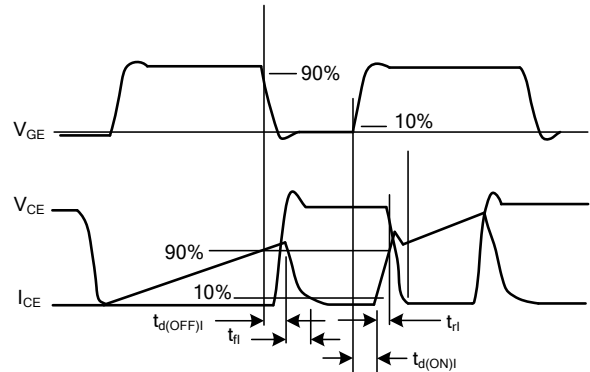


Fig 2. SWITCHING TEST WAVEFORMS

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