



UTG40N65LLS5

Insulated Gate Bipolar Transistor

650V TRENCH GATE FIELD-STOP IGBT

■ DESCRIPTION

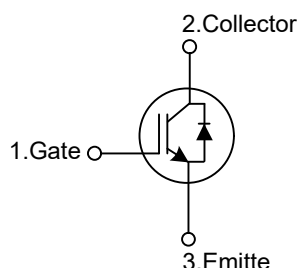
The UTC **UTG40N65LLS5** is an Trench Field-Stop Insulated Gate Bipolar Transistor. it uses UTC's advanced technology to provide customers with high switching speed, low saturation voltage and low switching loss, etc.

The UTC **UTG40N65LLS5** 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

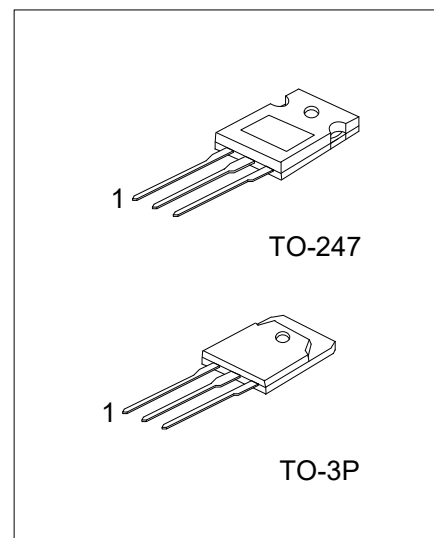


■ ORDERING INFORMATION

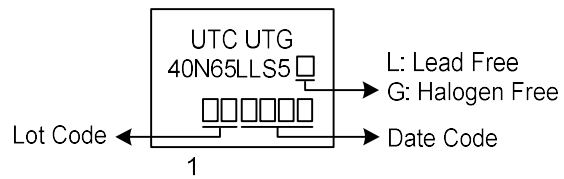
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UTG40N65LLS5L-T47-T	UTG40N65LLS5G-T47-T	TO-247	G	C	E	Tube
UTG40N65LLS5L-T3P-T	UTG40N65LLS5G-T3P-T	TO-3P	G	C	E	Tube

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

UTG40N65LLS5G-T47-T		(1) Packing Type	(1) T: Tube
		(2) Package Type	(2) T47: TO-247, T3P: TO-3P
		(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 specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage		V_{CES}	650	V
Gate-Emitter Voltage		V_{GES}	± 20	V
Transient Gate-Emitter Voltage (tp < 5 ms)			± 25	V
Continuous Collector Current	Tc=25°C	I_C	80	A
	Tc=100°C		40	A
Collector Current Pulsed (Note 1)		I_{CM}	160	A
Diode Forward Current	Tc=25°C	I_F	80	A
	Tc=100°C		40	A
Short Circuit Withstand Time $V_{GE} = 15V, V_{CC} \leq 200V$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0s$ $T_{VJ} = 25^{\circ}C$		t_{SC}	8	μs
Power Dissipation (Tc=25°C)	TO-247	P_D	298	W
	TO-3P		320	W
Operating Junction Temperature		T_J	-40 ~ +150	°C
Storage Temperature Range		T_{STG}	-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	TO-247	θ_{JC}	0.41	$^{\circ}\text{C/W}$
	TO-3P		0.39	$^{\circ}\text{C/W}$

■ ELECTRICAL CHARACTERISTICS (T_C=25°C, unless otherwise specified)

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	μA
G-E Leakage Current	I _{GES}	V _{CE} =0V, V _{GE} =±20V				±400	nA
On Characteristics							
Gate to Emitter Threshold Voltage	V _{GE(TH)}	I _C =250μA, V _{CE} =V _{GE}		4.0		7.0	V
Collector to Emitter Saturation Voltage	V _{CE(SAT)}	I _C =40A, V _{GE} =15V	T _C =25°C		1.6	2.1	V
			T _C =125°C		1.9		V
Dynamic Characteristics							
Input Capacitance	C _{IES}	V _{CE} =25V, V _{GE} =0V, f=1MHz			2400		pF
Output Capacitance	C _{OES}				198		pF
Reverse Transfer Capacitance	C _{RES}				50		pF
Switching Characteristics							
Total Gate Charge	Q _G	V _{CE} =520V, I _C =40A, V _{GE} =15V			105		nC
Gate-Emitter Charge	Q _{GE}				30		nC
Gate-Collector Charge	Q _{GC}				51		nC
Turn-On Delay Time	t _{DON}	V _{CC} =400V, I _C =40A, R _G =5Ω, V _{GE} =0~15V, L=500μH			17		ns
Rise Time	t _R				40		ns
Turn-Off Delay Time	t _{DOFF}				87		ns
Fall Time	t _F				46		ns
Turn-On Switching Loss	E _{ON}				1.9		mJ
Turn-Off Switching Loss	E _{OFF}				0.8		mJ
SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS							
Forward Voltage Drop	V _F	I _F =40A			2	2.5	V
Reverse Recovery Time	t _{rr}	I _F =40A, dI/dt=100A/μS, V _{CC} =400V			32		ns
Reverse Recovery Charge	Q _{rr}				182		nC

■ TEST CIRCUIT AND WAVEFORMS

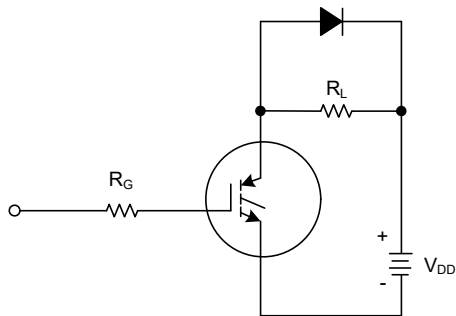


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

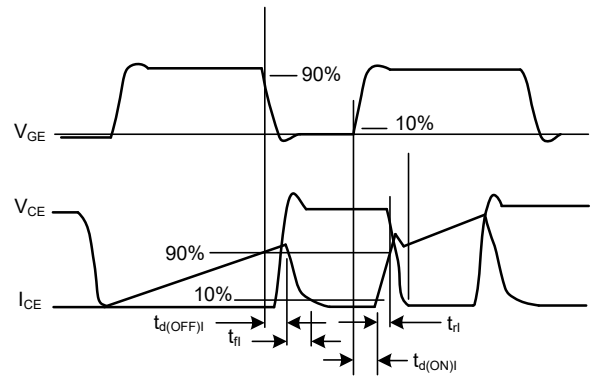
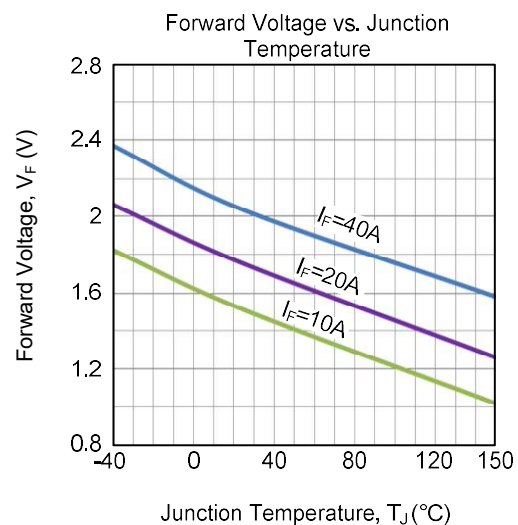
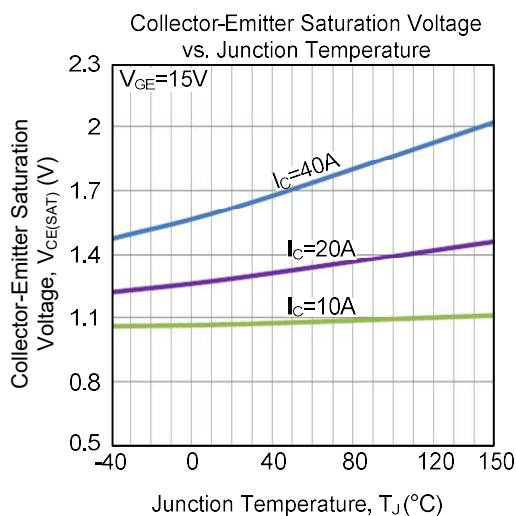
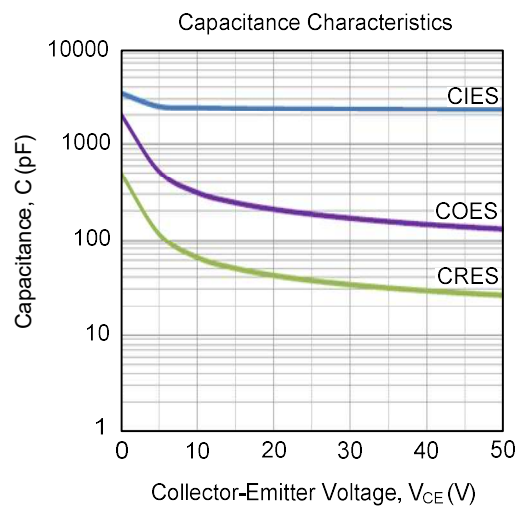
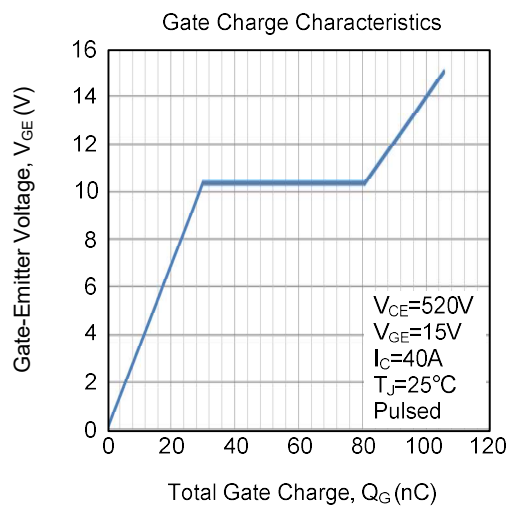
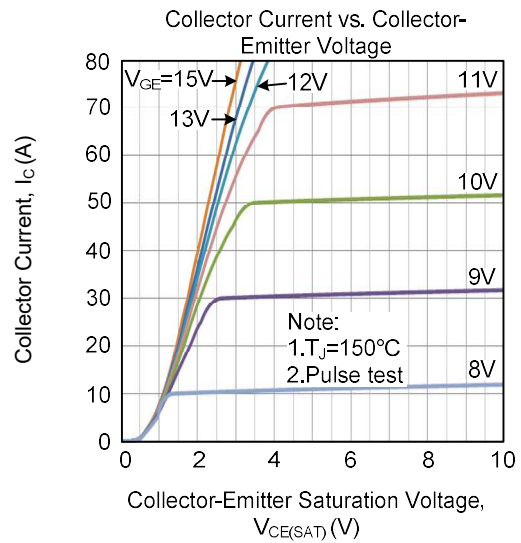
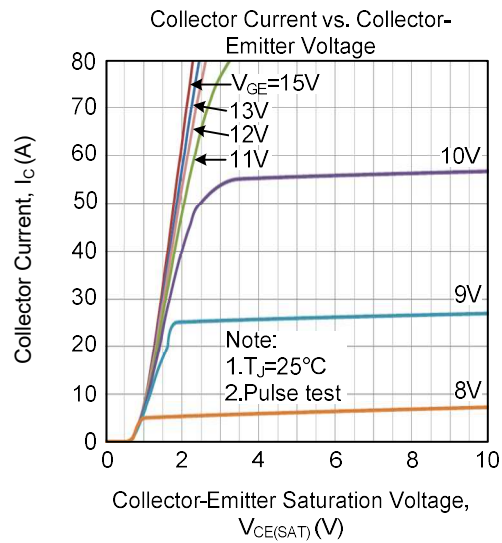
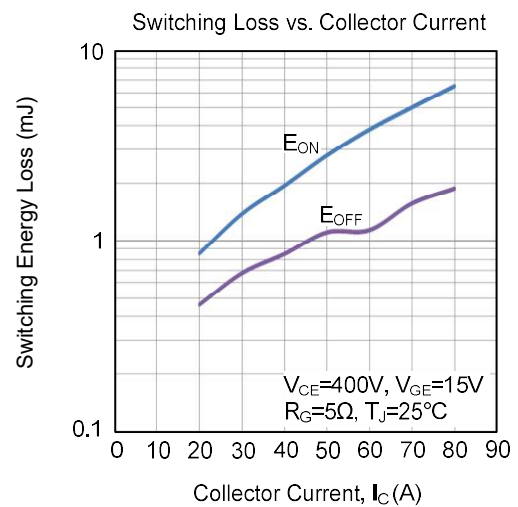
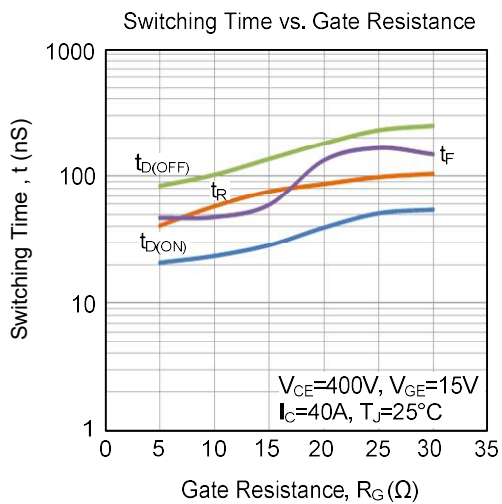
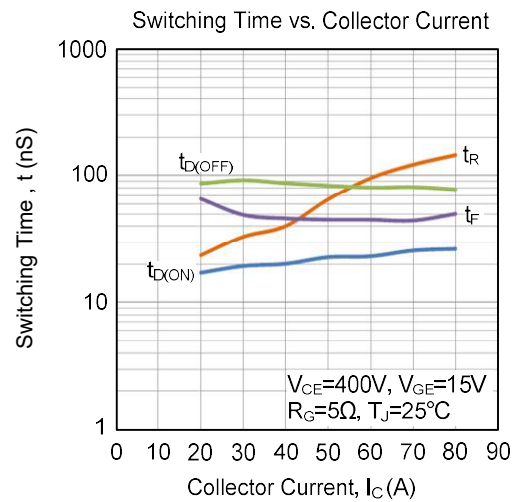
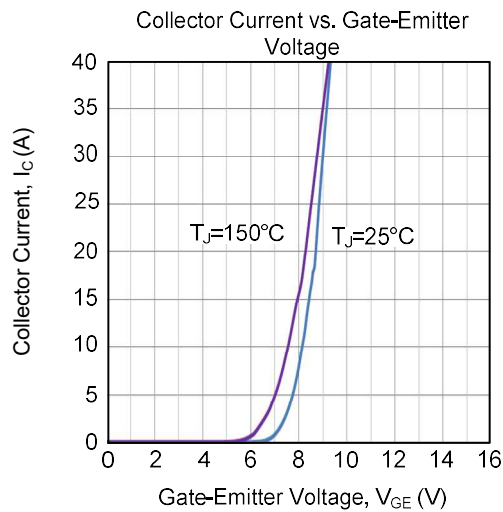
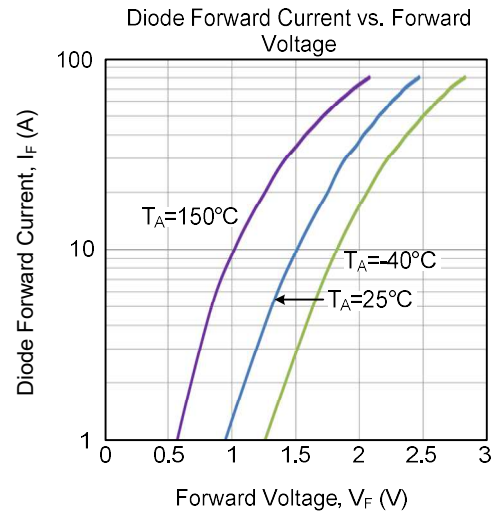
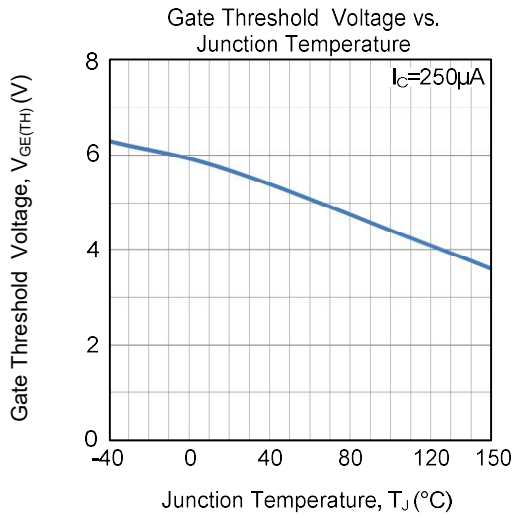


Fig 2. SWITCHING TEST WAVEFORMS

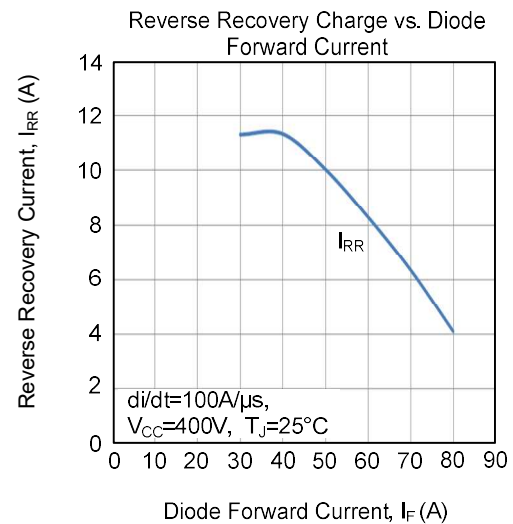
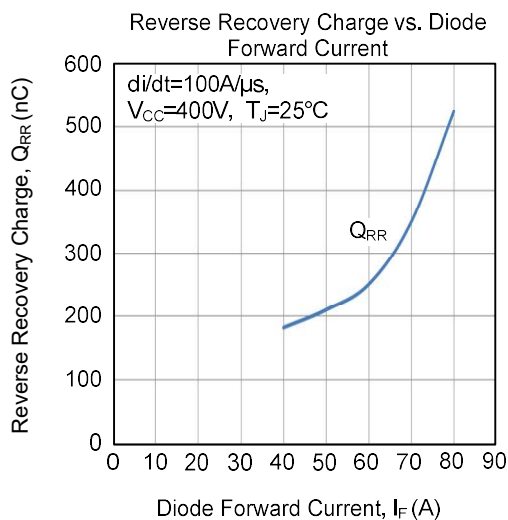
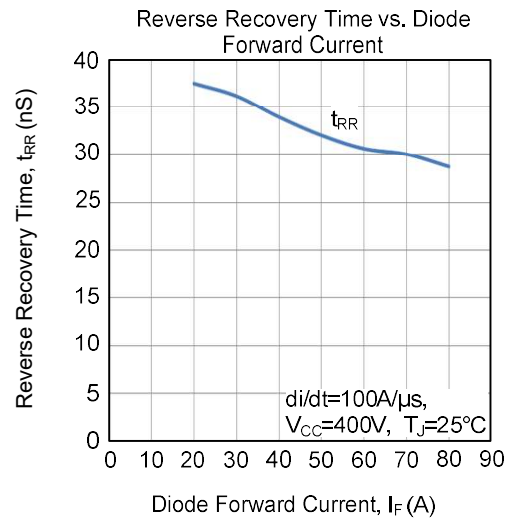
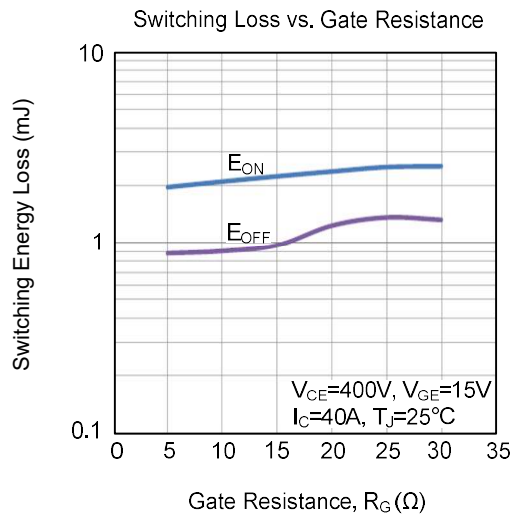
■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



■ TYPICAL CHARACTERISTICS (Cont.)



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