



# UGV3040

## Insulated Gate Bipolar Transistor

### 300mJ, 400V N-CHANNEL IGNITION IGBT

■ DESCRIPTION

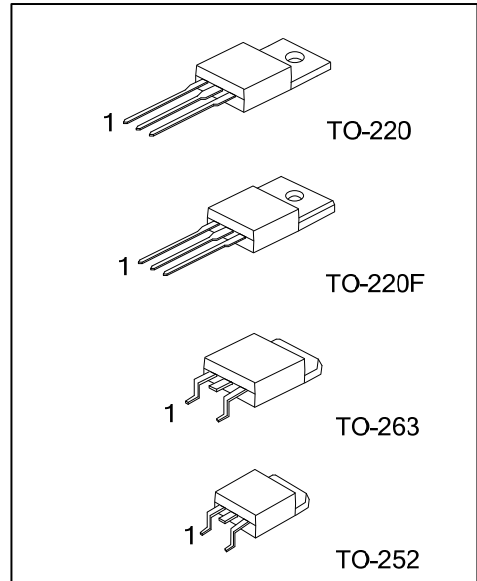
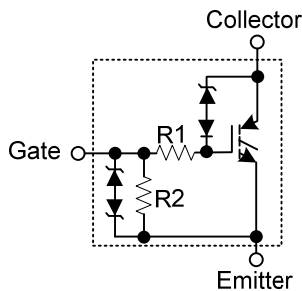
The UTC **UGV3040** is an N-channel ignition Insulated Gate Bipolar Transistor. It uses UTC's advanced technology to provide customers with outstanding SCIS capability.

The UTC **UGV3040** is suitable for Coil -On plug applications and Automotive Ignition Coil driver circuits, etc.

■ FEATURES

- \* Outstanding SCIS capability
- \* Logic level gate drive

■ SYMBOL



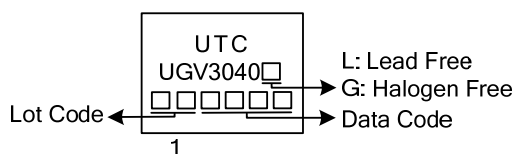
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UGV3040L-TA3-T	UGV3040G-TA3-T	TO-220	G	C	E	Tube
UGV3040L-TF3-T	UGV3040G-TF3-T	TO-220F	G	C	E	Tube
UGV3040L-TN3-R	UGV3040G-TN3-R	TO-252	G	C	E	Tape Reel
UGV3040L-TQ2-T	UGV3040G-TQ2-T	TO-263	G	C	E	Tube
UGV3040L-TQ2-R	UGV3040G-TQ2-R	TO-263	G	C	E	Tape Reel

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

<p>UGV3040L-TA3-T</p>	<p>(1) T: Tube, R: Tape Reel                  (2) TA3: TO-220, TF3: TO-220F, TN3: TO-252                  TQ2: TO-263                  (3) L: Lead Free, G: Halogen Free and Lead Free</p>
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■ MARKING



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

PARAMETER		SYMBOL	RATINGS	UNIT
Collector to Emitter Breakdown Voltage		$BV_{\text{CER}}$	450	V
Emitter to Collector Voltage Reverse Battery Condition		$BV_{\text{ECS}}$	30	V
At Starting	$T_J=25^\circ\text{C}$ , $I_{\text{SCIS}}=14.2\text{A}$ , $L=3.0\text{mHy}$	$E_{\text{SCIS}}$	300	mJ
	$T_J=150^\circ\text{C}$ , $I_{\text{SCIS}}=10.6\text{A}$ , $L=3.0\text{mHy}$		170	mJ
Continuous Collector Current	$T_C=25^\circ\text{C}$	$I_C$	21	A
	$T_C=110^\circ\text{C}$		17	A
Gate to Emitter Voltage Continuous		$V_{\text{GEM}}$	$\pm 10$	V
Power Dissipation Total at $T_C=25^\circ\text{C}$	TO-220/TO-263	$P_D$	125	W
	TO-220F		41.6	
	TO-252		125	
Power Dissipation Derating $T_C>25^\circ\text{C}$	TO-220/TO-263		1	W/ $^\circ\text{C}$
	TO-220F		0.332	
	TO-252		1	
Electrostatic Discharge Voltage at 100pF, 1500 $\Omega$		ESD	4	kV
Junction Temperature		$T_J$	-40 ~ +175	$^\circ\text{C}$
Storage Temperature Range		$T_{\text{STG}}$	-40 ~ +175	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	TO-220/TO-252	$\theta_{\text{JC}}$	1.0	$^\circ\text{C/W}$
	TO-263			
	TO-220F		3.0	

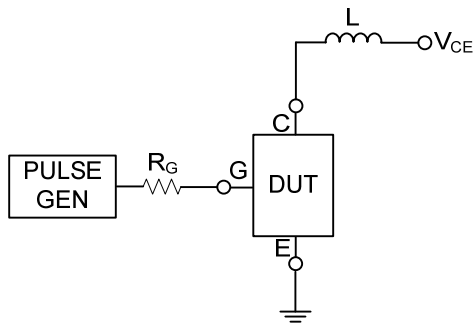
■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
<b>Off State Characteristics</b>							
Collector to Emitter Breakdown Voltage	$BV_{CER}$	$I_C=2\text{mA}$ , $V_{GE}=0\text{V}$ , $R_G=1\text{K}\Omega$ , $T_J=-40\sim 150^\circ\text{C}$	350	400	450	V	
Collector to Emitter to Breakdown Voltage	$BV_{CES}$	$I_C=10\text{mA}$ , $V_{GE}=0\text{V}$ , $R_G=0$ , $T_J=-40\sim 150^\circ\text{C}$	400	450	500	V	
Emitter to Collector Breakdown Voltage	$BV_{ECS}$	$I_C=-75\text{mA}$ , $V_{GE}=0\text{V}$ , $T_C=25^\circ\text{C}$	30			V	
Gate to Emitter Breakdown Voltage	$BV_{GES}$	$I_{GES}=\pm 2\text{mA}$	$\pm 12$	$\pm 14$		V	
Collector to Emitter Leakage Current	$I_{CER}$	$V_{CER}=250\text{V}$ , $R_G=1\text{K}\Omega$	$T_C=25^\circ\text{C}$		25	$\mu\text{A}$	
			$T_C=150^\circ\text{C}$		1	mA	
Emitter to Collector Leakage Current	$I_{ECS}$	$V_{EC}=24\text{V}$	$T_C=25^\circ\text{C}$		1	mA	
			$T_C=150^\circ\text{C}$		40	mA	
Series Gate Resistance	$R_1$			70		$\Omega$	
Gate to Emitter Resistance	$R_2$		10K		26K	$\Omega$	
<b>On State Characteristics</b>							
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=6\text{A}$ , $V_{GE}=4\text{V}$	$T_C=25^\circ\text{C}$		1.25	1.60	V
		$I_C=10\text{A}$ , $V_{GE}=4.5\text{V}$	$T_C=150^\circ\text{C}$		1.40	1.80	V
		$I_C=15\text{A}$ , $V_{GE}=4.5\text{V}$	$T_C=150^\circ\text{C}$		1.90	2.20	V
<b>Dynamic Characteristics</b>							
Gate Charge	$Q_{G(ON)}$	$I_C=10\text{A}$ , $V_{CE}=12\text{V}$ , $V_{GE}=5\text{V}$		17		nC	
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=1.0\text{mA}$ , $V_{CE}=V_{GE}$	1.3		2.2	V	
Gate to Emitter Plateau Voltage	$V_{GEP}$	$I_C=10\text{A}$ , $V_{CE}=12\text{V}$		3.0		V	
<b>Switching Characteristics</b>							
Current Turn-On Delay Time-Resistive	$t_{d(ON)R}$	$V_{CE}=14\text{V}$ , $R_L=1\Omega$ , $V_{GE}=5\text{V}$ , $R_G=1\text{K}\Omega$ , $T_J=25^\circ\text{C}$		0.48	4	$\mu\text{s}$	
Current Rise Time-Resistive	$t_{rR}$			2.1	7	$\mu\text{s}$	
Current Turn-Off Delay Time-Inductive	$t_{d(OFF)L}$			1.4	15	$\mu\text{s}$	
Current Fall Time Inductive	$t_{fL}$			2.2	15	$\mu\text{s}$	
Self Clamped Inductive Switching	SCIS	$T_J=25^\circ\text{C}$ , $L=3.0\text{mH}$ , $R_G=1\text{K}\Omega$ , $V_{GE}=5\text{V}$			300	mJ	

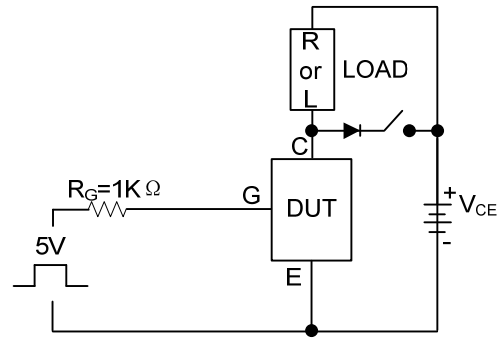
Notes: 1. Pulse Test: Pulse width  $\leq 300\mu\text{s}$ , Duty cycle  $\leq 2\%$

2. Essentially independent of operating temperature

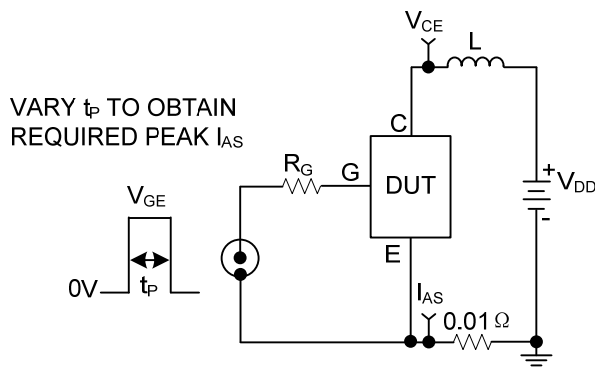
### ■ TEST CIRCUIT AND WAVEFORMS



Inductive Switching Test Circuit

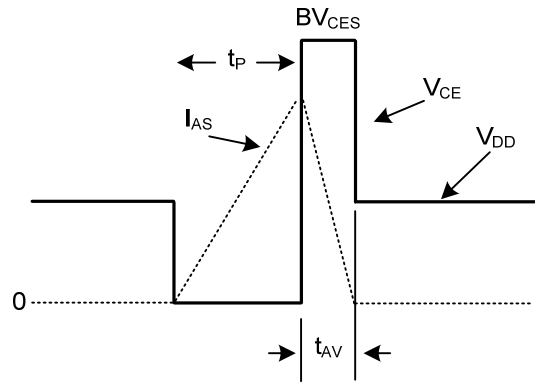


$t_{ON}$  and  $t_{OFF}$  Switching Test Circuit



VARY  $t_p$  TO OBTAIN  
REQUIRED PEAK  $I_{AS}$

Energy Test Circuit



Energy Waveforms

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