



UGV20N40

Insulated Gate Bipolar Transistor

20A, 400V N-CHANNEL IGNITION IGBT

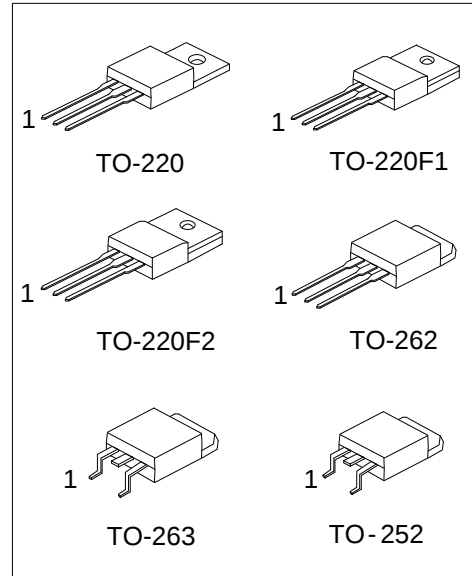
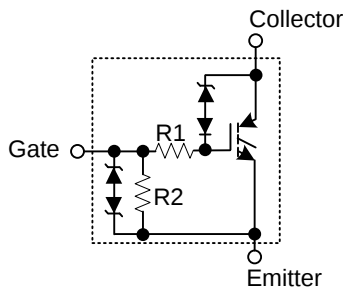
■ DESCRIPTION

The UTC **UGV20N40** is Logic Level Insulated Gate Bipolar Transistor (IGBT) features monolithic circuitry integrating ESD. Primary uses include Ignition, Direct Fuel Injection, or wherever high voltage and high current switching is required. suitable for On plug applications and Overvoltage clamped protection for use in inductive coil drivers applications, etc.

■ FEATURES

- * Ideal for Coil-on-Plug and Driver-on-Coil Applications
- * Gate-Emitter ESD Protection
- * Temperature Compensated Gate-Collector Voltage Clamp Limits Stress Applied to Load
- * Integrated ESD Diode Protection
- * Low Threshold Voltage for Interfacing Power Loads to Logic or Microprocessor Devices
- * Low Saturation Voltage
- * High Pulsed Current Capability

■ SYMBOL



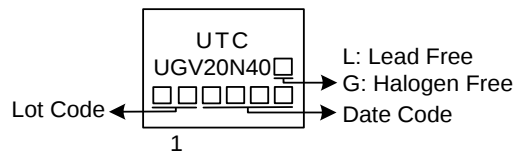
ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UGV20N40L-TA3-T	UGV20N40G-TA3-T	TO-220	G	C	E	Tube
UGV20N40L-TF1-T	UGV20N40G-TF1-T	TO-220F1	G	C	E	Tube
UGV20N40L-TF2-T	UGV20N40G-TF2-T	TO-220F2	G	C	E	Tube
UGV20N40L-TN3-R	UGV20N40G-TN3-R	TO-252	G	C	E	Tape Reel
UGV20N40L-T2Q-T	UGV20N40G-T2Q-T	TO-262	G	C	E	Tube
UGV20N40L-TQ2-T	UGV20N40G-TQ2-T	TO-263	G	C	E	Tube
UGV20N40L-TQ2-R	UGV20N40G-TQ2-R	TO-263	G	C	E	Tape Reel

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

UGV20N40G-TA3-T (1) Packing Type (2) Package Type (3) Green Package	(1) T: Tube, R: Tape Reel (2) TA3: TO-220, TF1: TO-220F1, TF3: TO-220F2, TN3: TO-252, T2Q: TO-262, TQ2: TO-263 (3) G: Halogen Free and Lead Free, L: Lead Free
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MARKING



■ ABSOLUTE MAXIMUM RATINGS (T_A=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Collector to Emitter Breakdown Voltage		BV _{CER}	440	V
Collector to Emitter Breakdown Voltage		BV _{CES}	440	V
Continuous Collector Current (T _C =25°C)		I _C	20	A _{DC}
			50	A _{AC}
Single Pulse Collector to Emitter Avalanche Energy (Note 3)		E _{AS}	250	mJ
Reverse Avalanche Energy		E _{AR}	2000	mJ
Gate to Emitter Voltage Continuous		V _{GEM}	±15	V
Power Dissipation Total at T _C =25°C	TO-220/TO-220F1 TO-262/TO-263	P _D	150	W
	TO-220F2		41.7	W
	TO-252		70	W
Electrostatic Discharge Voltage at 100pF, 1500Ω		ESD	8	kV
Junction Temperature		T _J	-40 ~ +175	°C
Storage Temperature Range		T _{STG}	-40 ~ +175	°C

Notes: 1. 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.

2. Repetitive Rating: Pulse width limited by maximum junction temperature.

3. L=1.8mH, I_{AS}=16.7A, V_{DD}=50V, R_G=25Ω, Starting T_J = 25°C

■ THERMAL CHARACTERISTICS

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient (Note)	TO-220/TO-220F1 TO-220F2/TO-262 TO-263	θ _{JA}	62.5	°C/W
	TO-252		110	°C/W
Junction to Case	TO-220/TO-220F1 TO-262/TO-263	θ _{JC}	1.0	°C/W
	TO-220F2		3	°C/W
	TO-252		2.14	°C/W

Note: When surface mounted to an FR4 board using the minimum recommended pad size.

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off CHARACTERISTICS						
Collector-Emitter Clamp Voltage	BV _{CES}	IC=2.0mA, T _J =-40°C ~ +175°C	370		420	V
		IC=10mA, T _J =-40°C ~ +175°C	390		440	V
Zero Gate Voltage Collector Current	I _{CES}	V _{CE} =15V, V _{GE} =0V, T _J =25°C			1.0	μA
		V _{CE} =200V, V _{GE} =0V	T _J =25°C		1.0	μA
			T _J =25°C	0.5	10	μA
			T _J =175°C	1.0	100	μA
					(Note 3)	
			T _J =-40°C	0.4	5.0	μA
Reverse Collector-Emitter Leakage Voltage	I _{CES(R)}	I _C =-24mA	T _J =25°C	0.05	1.0	mA
			T _J =175°C	1.0	25	mA
			T _J =-40°C	0.005	0.2	mA
Gate-Emitter Clamp Voltage	BV _{GES}	I _G =±5.0mA	12		14	V
Gate-Emitter Leakage Current	I _{GES}	V _{GE} =5.0V	200		350	μA
					(Note 3)	
Gate Resistor	R _G			70		Ω
Gate-Emitter Resistor	R _{GE}		14.25		25	kΩ

■ ELECTRICAL CHARACTERISTICS (Cont.)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
ON CHARACTERISTICS (Note 1)							
Gate Threshold Voltage	V _{GE(th)}	I _C =1.0mA, V _{GE} =V _{CE}	T _J =25°C	1.5	1.8	2.1	V
			T _J =175°C	0.7	1.0	1.3	V
			T _J =-40°C	1.7	2.0	2.3 (Note 3)	V
Collector-to-Emitter On-Voltage	V _{CE(ON)}	I _C =6.5A, V _{GE} =3.7V	T _J =25°C	0.85		1.35	V
			T _J =175°C	0.7		1.15	V
			T _J =-40°C			1.4	V
		I _C =9.0A, V _{GE} =3.9V	T _J =25°C	0.9		1.45	V
			T _J =175°C	0.8		1.25	V
			T _J =-40°C	1.0		1.5	V
		I _C =7.5A, V _{GE} =4.5V	T _J =25°C	0.85		1.4	V
			T _J =175°C	0.7		1.2	V
			T _J =-40°C	1.0		1.6 (Note 3)	V
		I _C =10A, V _{GE} =4.5V	T _J =25°C	1.0		1.6	V
			T _J =175°C	0.8		1.4	V
			T _J =-40°C	1.1		1.7 (Note 3)	V
		I _C =15A, V _{GE} =4.5V	T _J =25°C	1.15		1.7	V
			T _J =175°C	1.0		1.55	V
			T _J =-40°C	1.25		1.8 (Note 3)	V
		I _C =20A, V _{GE} =4.5V	T _J =25°C	1.1		1.9	V
			T _J =175°C	1.2		1.8	V
			T _J =-40°C	1.3		2.0	V
DYNAMIC CHARACTERISTICS							
Input Capacitance	C _{ISS}	f=1.0MHz, V _{CE} =25V, T _J =25°C		720		pF	
Output Capacitance	C _{OSS}			220		pF	
Transfer Capacitance	C _{RSS}			77		pF	
SWITCHING CHARACTERISTICS							
Turn-ON Delay Time (Note 1)	t _{D(ON)}	V _{CC} =300V, V _{GE} =5.0V, I _C =9.0A, R _L =33Ω, R _G =25Ω		55		ns	
Rise Time	t _R			110		ns	
Turn-OFF Delay Time	t _{D(OFF)}			750		ns	
Fall-Time	t _F			350		ns	

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

2. Essentially independent of operating temperature.

3. Maximum Value of Characteristic across Temperature Range.

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