



## UPG22N60

Insulated Gate Bipolar Transistor

### 600V, SMPS N-CHANNEL IGBT

#### DESCRIPTION

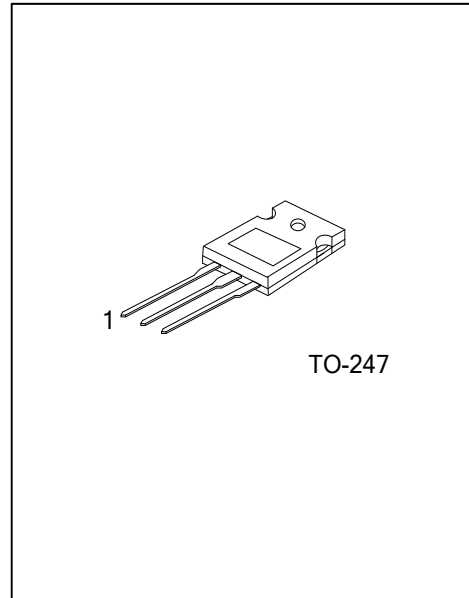
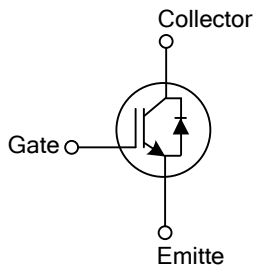
The UTC **UPG22N60** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG22N60** is suitable for high voltage switching, high frequency switch mode power supplies.

#### FEATURES

- \*  $V_{CE(SAT)} \leq 2.5V @ I_C=22A, V_{GE}=15V$
- \* 600V Switching SOA Capability
- \* High switching speed
- \* High input impedance
- \* Low conduction loss

#### SYMBOL



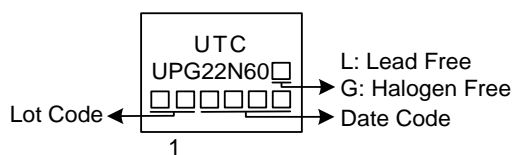
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG22N60L-T47-T	UPG22N60G-T47-T	TO-247	G	C	E	Tube

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

UPG22N60G-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>C</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage	V <sub>CES</sub>	600	V
Gate to Emitter Voltage Continuous	V <sub>GES</sub>	±20	V
Continuous Collector Current	I <sub>C</sub>	T <sub>C</sub> =25°C	44
		T <sub>C</sub> =100°C	22
Collector Current Pulsed (Note 2)	I <sub>CM</sub>	88	A
Single Pulse Avalanche Energy (Note 3)	E <sub>AS</sub>	39.2	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	6.2	V/ns
Power Dissipation	P <sub>D</sub>	400	W
Junction Temperature	T <sub>J</sub>	-55 ~ +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +150	°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=10mH, PK<sub>IL</sub>=2.8A, V<sub>CC</sub>=50V, R<sub>G</sub>=25Ω, Starting T<sub>J</sub>=25°C  
 4. I<sub>F</sub> ≤ 22A, di/dt ≤ 200A/μs, V<sub>CC</sub> ≤ BV<sub>CES</sub>, Starting T<sub>J</sub>=25°C

### ■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Case	θ <sub>JC</sub>	0.36	°C/W

### ■ ELECTRICAL CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>	I <sub>C</sub> =250μA, V <sub>GE</sub> =0V	600			V
Collector-Emitter Leakage Current	I <sub>CES</sub>	V <sub>CE</sub> =600V, V <sub>GE</sub> =0V			200	μA
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =22A, V <sub>GE</sub> =15V	T <sub>J</sub> =25°C	2.0	2.5	V
			T <sub>J</sub> =150°C	2.4		V
Gate to Emitter Threshold Voltage	V <sub>GE(TH)</sub>	I <sub>C</sub> =250μA, V <sub>CE</sub> =V <sub>GE</sub>	4.0		6.5	V
Gate to Emitter Leakage Current	I <sub>GES</sub>	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V			±100	nA
Input Capacitance	C <sub>IES</sub>	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz		2235		pF
Output Capacitance	C <sub>OES</sub>			295		pF
Reverse Transfer Capacitance	C <sub>RES</sub>			56		pF
Total Gate Charge	Q <sub>G</sub>			102		nC
Gate-Emitter Charge	Q <sub>GE</sub>	I <sub>C</sub> =15A, V <sub>CE</sub> =50V, V <sub>GE</sub> =15V		18.5		nC
Gate-Collector Charge	Q <sub>GC</sub>			34.5		nC
Current Turn-On Delay Time	t <sub>D(ON)</sub>			44.5		ns
Current Rise Time	t <sub>R</sub>	I <sub>C</sub> =15A, V <sub>CE</sub> =50V, V <sub>GE</sub> =15V, R <sub>G</sub> =10Ω		31.5		ns
Current Turn-Off Delay Time	t <sub>D(OFF)</sub>			183		ns
Current Fall Time	t <sub>F</sub>			45.5		ns

### SOURCE- DRAIN DIODE RATINGS AND CHARACTERISTICS

Forward Voltage Drop	V <sub>FM</sub>	I <sub>F</sub> =22A		1.3		V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =22A, di/dt=100A/μS, V <sub>R</sub> =400V		165		ns
Reverse Recovery Charge	Q <sub>rr</sub>			0.66		μC

Note: Pulse Test: Pulse width ≤ 50μs.

### ■ TEST CIRCUIT AND WAVEFORMS

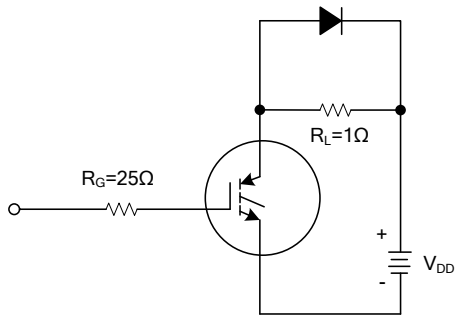


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

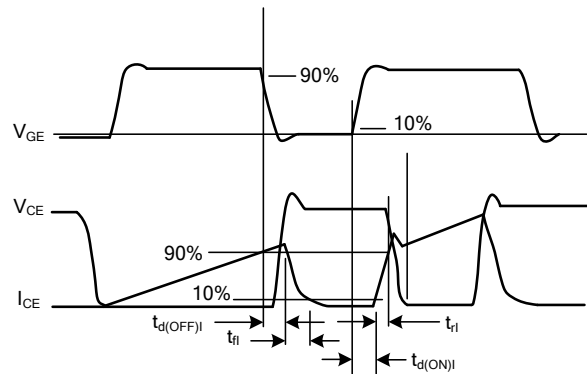
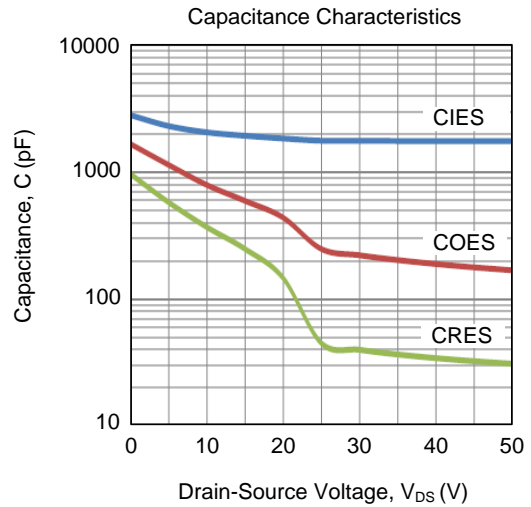
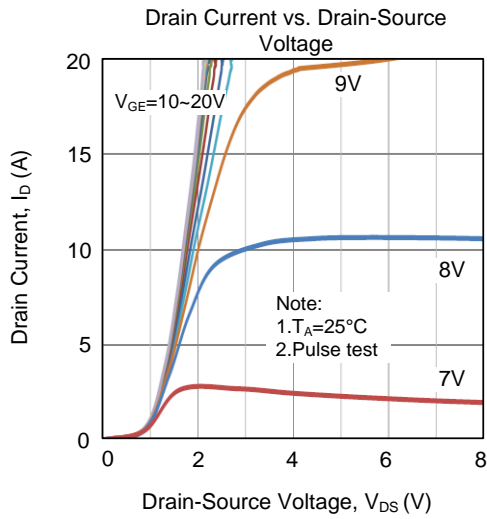


Fig 2. SWITCHING TEST WAVEFORMS

### ■ TYPICAL CHARACTERISTICS



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