



## UPG10N65

Preliminary

Insulated Gate Bipolar Transistor

### 650V, SMPS N-CHANNEL IGBT

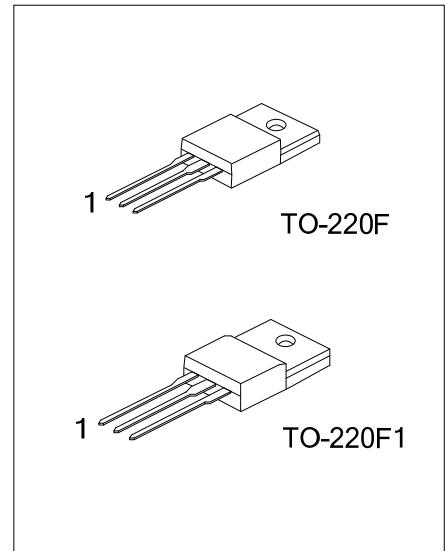
#### DESCRIPTION

The UTC **UPG10N65** 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.

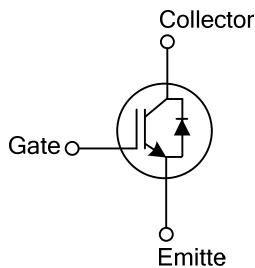
The UTC **UPG10N65** is suitable for high voltage switching, high frequency switch mode power supplies.

#### FEATURES

- \*  $V_{CE(SAT)} \leq 2.0V$  @  $I_C=10A$ ,  $V_{GE}=15V$
- \* High switching speed
- \* High input impedance
- \* Low conduction loss



#### SYMBOL



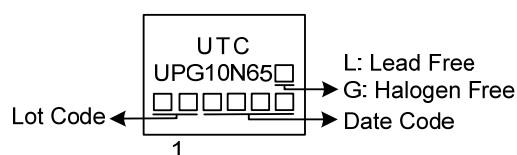
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG10N65L-TF1-T	UPG10N65G-TF1-T	TO-220F1	G	C	E	Tube
UPG10N65L-TF3-T	UPG10N65G-TF3-T	TO-220F	G	C	E	Tube

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

<p>UPG10N65G-TF1-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) TF1: TO-220F1, TF3: TO-220F (3) G: Halogen Free and Lead Free, L: Lead Free</p>
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#### MARKING



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

PARAMETER	SYMBOL	RATINGS	UNIT
Collector-Emitter Voltage	$V_{CES}$	650	V
Gate to Emitter Voltage Continuous	$V_{GES}$	$\pm 20$	V
Continuous Collector Current	$I_C$	$T_C=25^\circ\text{C}$	20
		$T_C=100^\circ\text{C}$	10
Collector Current Pulsed (Note 2)	$I_{CM}$	40	A
Diode Forward Current	$I_F$	$T_C=25^\circ\text{C}$	20
		$T_C=100^\circ\text{C}$	10
Forward Current Pulsed	$I_{FM}$	40	A
Short Circuit Withstand Time $V_{GE} = 15\text{V}$ , $V_{CC} \leq 200\text{V}$ Allowed number of short circuits < 1000 Time between short circuits: $\geq 1.0\text{s}$ $T_{VJ} = 25^\circ\text{C}$	$t_{SC}$	10	$\mu\text{s}$
Power Dissipation	$P_D$	30	W
Junction Temperature	$T_J$	$-55 \sim +150$	$^\circ\text{C}$
Storage Temperature Range	$T_{STG}$	$-55 \sim +150$	$^\circ\text{C}$

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.  $I_F \leq 9.0\text{A}$ ,  $di/dt \leq 200\text{A}/\mu\text{s}$ ,  $V_{CC} \leq BV_{CES}$ , Starting  $T_J=25^\circ\text{C}$

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	62.5	$^\circ\text{C}/\text{W}$
Junction to Case	$\theta_{JC}$	4.167	$^\circ\text{C}/\text{W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>OFF CHARACTERISTICS</b>						
Collector-Emitter Breakdown Voltage	BV <sub>CES</sub>	I <sub>C</sub> =250μA, V <sub>GE</sub> =0V	650			V
Collector-Emitter Leakage Current	I <sub>CES</sub>	V <sub>CE</sub> =650V, V <sub>GE</sub> =0V			10	μA
Gate to Emitter Leakage Current	I <sub>GES</sub>	V <sub>CE</sub> =0V, V <sub>GE</sub> =±20V			±400	nA
<b>ON CHARACTERISTICS</b>						
Gate to Emitter Threshold Voltage	V <sub>GE(TH)</sub>	I <sub>C</sub> =250μA, V <sub>CE</sub> =V <sub>GE</sub>	4		6.5	V
Collector-Emitter Saturation Voltage	V <sub>CE(SAT)</sub>	I <sub>C</sub> =10A, V <sub>GE</sub> =15V	T <sub>J</sub> =25°C	1.6	2.0	V
			T <sub>J</sub> =150°C	2.0		V
<b>DYNAMIC CHARACTERISTICS</b>						
Input Capacitance	C <sub>IES</sub>	V <sub>CE</sub> =25V, V <sub>GE</sub> =0V, f=1MHz		1320		pF
Output Capacitance	C <sub>OES</sub>			150.7		pF
Reverse Transfer Capacitance	C <sub>RES</sub>			24.5		pF
<b>SWITCHING CHARACTERISTICS</b>						
Total Gate Charge	Q <sub>G</sub>	I <sub>C</sub> =10A, V <sub>CE</sub> =520V, V <sub>GE</sub> =15V		73.5		nC
Gate-Emitter Charge	Q <sub>GE</sub>			17.3		nC
Gate-Collector Charge	Q <sub>GC</sub>			32		nC
Current Turn-On Delay Time	t <sub>D(ON)</sub>	V <sub>CC</sub> =400V, I <sub>C</sub> =10A, R <sub>G</sub> =10Ω, V <sub>GE</sub> =0~15V, L=100μH		19.7		ns
Current Rise Time	t <sub>R</sub>			11.3		ns
Current Turn-Off Delay Time	t <sub>D(OFF)</sub>			52.7		ns
Current Fall Time	t <sub>F</sub>			96.1		ns
<b>DRAIN-SOURCE DIODE CHARACTERISTICS</b>						
Forward Voltage Drop	V <sub>FM</sub>	I <sub>F</sub> =10A			1.4	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> =10A, dI/dt=100A/μS, V <sub>CC</sub> =400V		51.3		ns
Reverse Recovery Charge	Q <sub>rr</sub>			70.3		nC

Note: Pulse Test: Pulse width ≤ 50μs.

■ TEST CIRCUIT AND WAVEFORMS

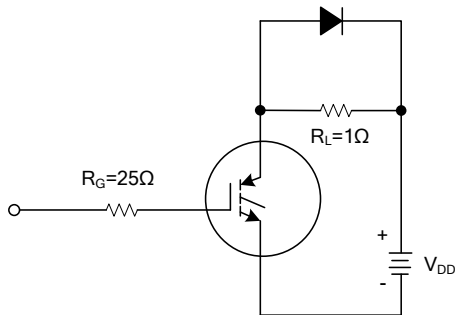


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

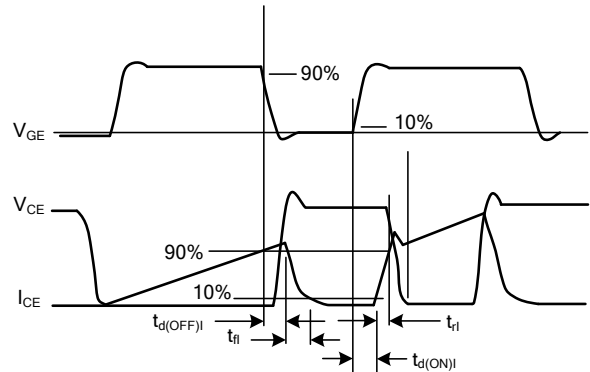


Fig 2. SWITCHING TEST WAVEFORMS

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