



## UPG9N65

Preliminary

Insulated Gate Bipolar Transistor

### 650V, SMPS N-CHANNEL IGBT

#### DESCRIPTION

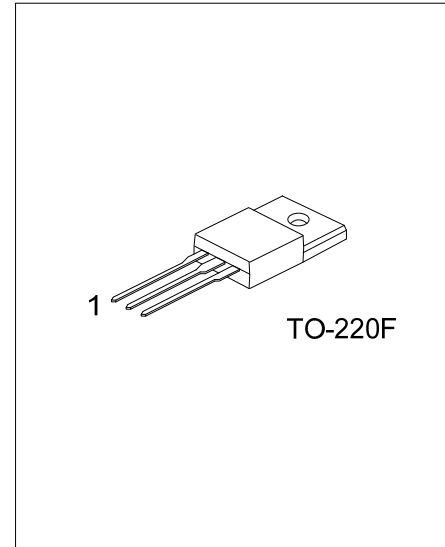
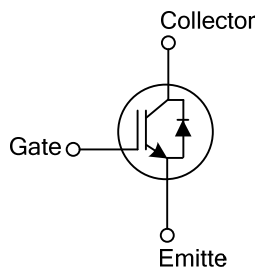
The UTC **UPG9N65** is a N-channel IGBT. it uses UTC's advanced technology to provide customers with high input impedance, high switching speed and low conduction loss, etc.

The UTC **UPG9N65** is suitable for high voltage switching, high frequency switch mode power supplies.

#### FEATURES

- \*  $V_{CE(SAT)} \leq 2.4V$  @  $I_C=9.0A$ ,  $V_{GE}=15V$
- \* High switching speed
- \* High input impedance
- \* Low conduction loss

#### SYMBOL



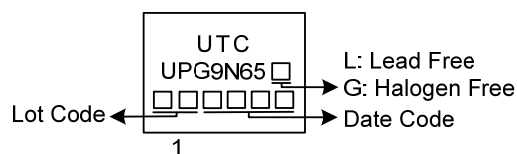
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
UPG9N65L-TF3-T	UPG9N65G-TF3-T	TO-220F	G	C	E	Tube

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

<p>UPG9N65G-TF3-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>		<p>(1) T: Tube (2) 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	$T_C=25^{\circ}\text{C}$	$I_C$	18	A
	$T_C=100^{\circ}\text{C}$		9	A
Collector Current Pulsed (Note 2)		$I_{CM}$	27	A
Continuous Forward Current	$T_C=25^{\circ}\text{C}$	$I_F$	9	A
	$T_C=100^{\circ}\text{C}$		4.5	A
Forward Current Pulsed		$I_{FM}$	70	A
Peak Diode Recovery dv/dt (Note 3)		dv/dt	7	V/ns
Power Dissipation		$P_D$	26	W
Junction Temperature		$T_J$	-55 ~ +150	$^{\circ}\text{C}$
Storage Temperature Range		$T_{STG}$	-55 ~ +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	$\theta_{JC}$	4.81	$^{\circ}\text{C}/\text{W}$

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

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Collector-Emitter Breakdown Voltage	$BV_{CES}$	$I_C=250\mu A, V_{GE}=0V$		650			V
Collector-Emitter Leakage Current	$I_{CES}$	$V_{CE}=650V, V_{GE}=0V$				10	$\mu A$
Gate to Emitter Leakage Current	$I_{GES}$	$V_{CE}=0V, V_{GE}=\pm 20V$				$\pm 400$	nA
ON CHARACTERISTICS							
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	$I_C=250\mu A, V_{CE}=V_{GE}$		4.0		6.0	V
Collector-Emitter Saturation Voltage	$V_{CE(SAT)}$	$I_C=9.0A, V_{GE}=15V$	$T_J=25^{\circ}C$		2.0	2.4	V
			$T_J=150^{\circ}C$		2.5		V
DYNAMIC CHARACTERISTICS							
Input Capacitance	$C_{IES}$	$V_{CE}=30V, V_{GE}=0V, f=1MHz$			638		pF
Output Capacitance	$C_{OES}$				70		pF
Reverse Transfer Capacitance	$C_{RES}$				12.7		pF
SWITCHING CHARACTERISTICS							
Total Gate Charge	$Q_G$	$I_C=9.0A, V_{CE}=100V, I_{GE}=1mA$			28		nC
Gate-Emitter Charge	$Q_{GE}$				12.5		nC
Gate-Collector Charge	$Q_{GC}$				10		nC
Current Turn-On Delay Time	$t_{D(ON)}$	$I_C=9.0A, V_{CE}=100V, V_{GE}=15V, R_G=10\Omega$			7		ns
Current Rise Time	$t_R$				17		ns
Current Turn-Off Delay Time	$t_{D(OFF)}$				36		ns
Current Fall Time	$t_F$				60		ns
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Voltage Drop	$V_{FM}$	$I_F=9.0A$				2.4	V
Reverse Recovery Time	$t_{rr}$	$I_F=9.0A, dI/dt=100A/\mu S, V_{CC}=400V$			58		ns
Reverse Recovery Charge	$Q_{rr}$				126		nC

Note: Pulse Test: Pulse width  $\leq 50\mu\text{s}$ .

## ■ TEST CIRCUIT AND WAVEFORMS

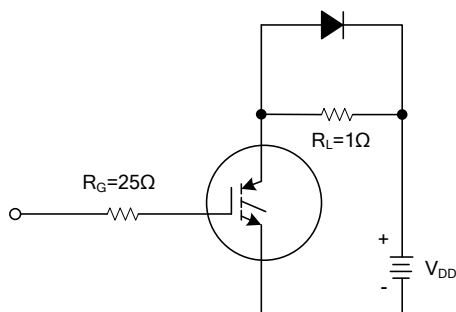


Fig 1. INDUCTIVE SWITCHING TEST CIRCUIT

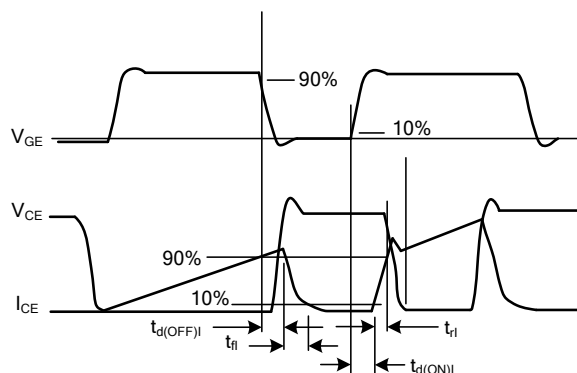


Fig 2. SWITCHING TEST WAVEFORMS

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