



**UT138FF/FG**

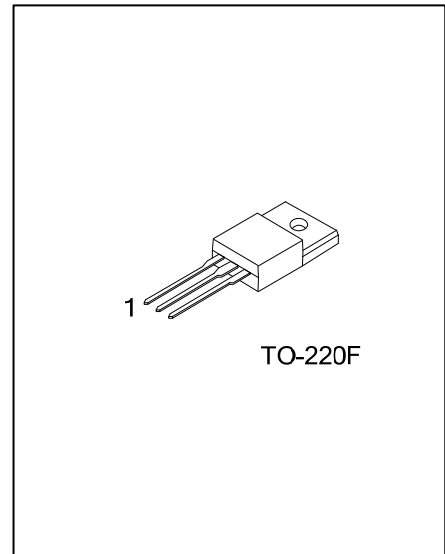
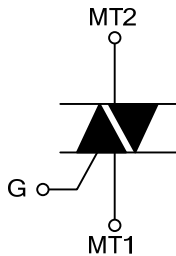
**TRIAC**

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■ **DESCRIPTION**

Glass passivated triac in a full pack plastic envelope, intended for use in applications requiring high bidirectional transient and blocking voltage capability and high thermal cycling performance. Typical applications include motor control, industrial and domestic lighting, heating and static switching.

■ **SYMBOL**



■ **ORDERING INFORMATION**

Ordering Number		Package	Pin Description			Packing
Lead Free	Halogen Free		1	2	3	
UT138FFL-x-TF3-R	UT138FFG-x-TF3-R	TO-220F	MT1	MT2	G	Tube
UT138FGL-x-TF3-R	UT138FGP-x-TF3-R	TO-220F	MT1	MT2	G	Tube

Note: Pin Assignment: G: Gate

<p>UT138FFL-x-TF3-T</p> <p>(1)Packing Type (2)Package Type (3)Peak Voltage (4)Green Package</p>	<p>(1) T: Tube (2) TF3: TO-220F (3) 5: 500V, 6: 600V, 8: 800V (4) L: Lead Free, G: Halogen Free and Lead Free P: Halogen Free and Lead Free</p>
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■ **MARKING**

UT138FF	UT138FG

## ■ ABSOLUTE MAXIMUM RATING

PARAMETER		SYMBOL	RATINGS	UNIT
Repetitive Peak Off-State Voltages	UT138FF/FG-5	$V_{DRM}$	500(Note2)	V
	UT138FF/FG-6		600(Note2)	
	UT138FF/FG-8		800	
RMS On-state Current Full sine wave, $T_{HS} \leq 92^{\circ}C$		$I_{T(RMS)}$	12	A
Non-Repetitive Peak. On-State Current Full sine wave, $T_J = 125^{\circ}C$ prior to surge, with reapplied $V_{DRM(MAX)}$	$t = 20$ ms	$I_{TSM}$	90	A
	$t = 16.7$ ms		100	
$I^2t$ For Fusing ( $t = 10$ ms)		$I^2t$	40	$A^2s$
Repetitive Rate of Rise of On-state Current after Triggering $I_{TM} = 12$ A, $I_G = 0.2$ A, $dI_G/dt = 0.2A/\mu s$	T2 + G+	$dI_T/dt$	50	A/ $\mu s$
	T2 + G-		50	
	T2 - G-		50	
	T2 - G+		10	
Peak Gate Voltage		$V_{GM}$	5	V
Peak Gate Current		$I_{GM}$	2	A
Peak Gate Power		$P_{GM}$	5	W
Average Gate Power (Over any 20ms period)		$P_{G(AV)}$	0.5	W
Operating Junction Temperature		$T_J$	125	$^{\circ}C$
Storage Temperature		$T_{STG}$	-40 ~ +150	$^{\circ}C$

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. Although not recommended, off-state voltages up to 800V may be applied without damage, but the triac may switch to the on-state. The rate of rise of current should not exceed 15A/ $\mu s$ .

## ■ THERMAL RESISTANCES

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
Thermal resistance Junction to Ambient	In Free Air	$\theta_{JA}$		55		$^{\circ}C/W$
Thermal resistance Junction to mounting base	Full cycle	$\theta_{JC}$			4.0	$^{\circ}C/W$
	Half cycle				5.5	$^{\circ}C/W$

## ■ ISOLATION LIMITING VALUE & CHARACTERISTIC ( $T_{HS} = 25^{\circ}C$ , unless otherwise specified)

PARAMETER		SYMBOL	MIN	TYP	MAX	UNIT
Repetitive peak voltage from all three terminals to external heatsink (R.H. $\leq 65\%$ , clean and dustfree)		$V_{ISOL}$			1500	V
Capacitance from MT2 to external heatsink ( $f = 1MHz$ )		$C_{ISOL}$		12		pF

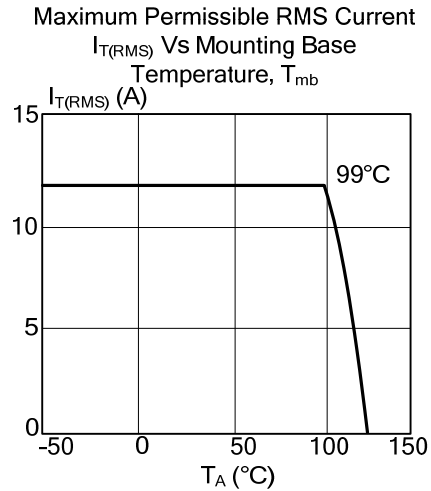
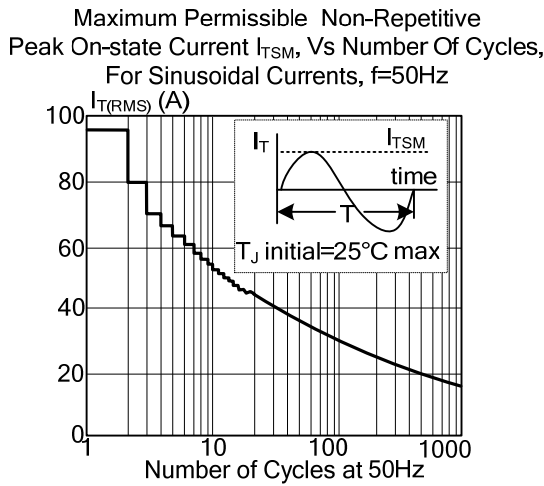
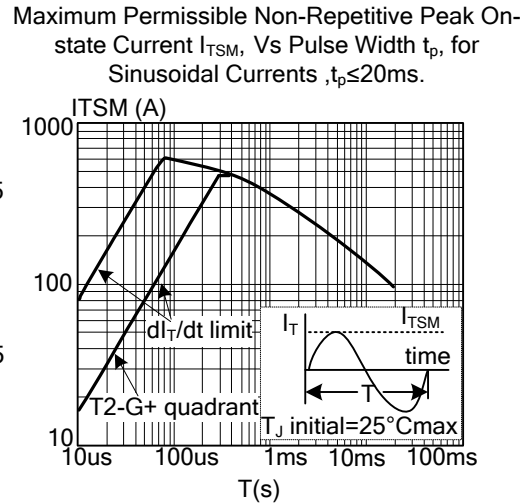
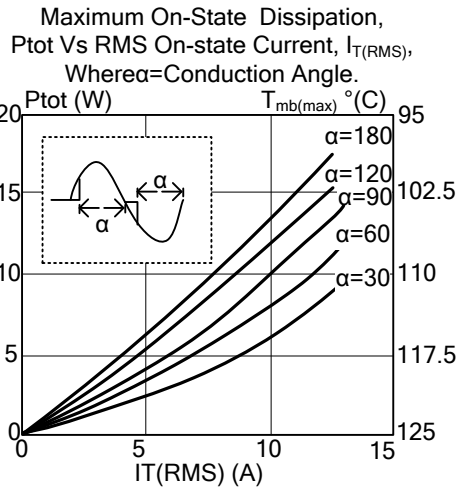
## ■ STATIC CHARACTERISTICS ( $T_J = 25^{\circ}C$ , unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX		UNIT
					UT138FF	UT138FG	
Gate Trigger Current	$I_{GT}$	$V_D = 12$ V, $I_T = 0.1$ A	T2 + G+	5	25	50	mA
			T2 + G-	8	25	50	mA
			T2 - G-	10	25	50	mA
			T2 - G+	22	70	100	mA
Latching Current	$I_L$	$V_D = 12$ V, $I_{GT} = 0.1$ A	T2 + G+	7	40	60	mA
			T2 + G-	20	60	90	mA
			T2 - G-	8	40	60	mA
			T2 - G+	10	60	90	mA
Holding Current	$I_H$	$V_D = 12$ V, $I_{GT} = 0.1$ A		6	30	60	mA
On-State Voltage	$V_T$	$I_T = 15$ A		1.4	1.65		V
Gate Trigger Voltage	$V_{GT}$	$V_D = 12$ V, $I_T = 0.1$ A		0.7	1.5		V
		$V_D = 400$ V, $I_T = 0.1$ A, $T_J = 125^{\circ}C$	0.25	0.4			V
Off-State Leakage Current	$I_D$	$V_D = V_{DRM(MAX)}$ , $T_J = 125^{\circ}C$		0.1	0.5		mA

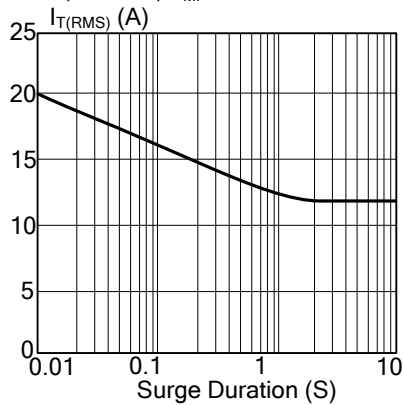
■ DYNAMIC CHARACTERISTICS (T<sub>J</sub>=25°C, unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN		TYP	MAX	UNIT
			UT138FF	UT138FG			
Critical Rate of Rise of Off-State Voltage	dV <sub>D</sub> /dt	V <sub>DM</sub> = 67% V <sub>DRM(MAX)</sub> , T <sub>J</sub> =125°C, exponential waveform, gate open circuit	100	200	250		V/μs
Critical Rate of Change of Commutating Voltage	dV <sub>COM</sub> /dt	V <sub>DM</sub> =400V, T <sub>J</sub> =95°C, I <sub>T(RMS)</sub> =12A, dI <sub>COM</sub> /dt=5.4A/ms, gate open circuit			20		V/μs
Gate Controlled Turn-On Time	t <sub>GT</sub>	I <sub>TM</sub> = 16A, V <sub>D</sub> = V <sub>DRM(MAX)</sub> , I <sub>G</sub> =0.1A, dI <sub>G</sub> /dt=5A/μs			2		μs

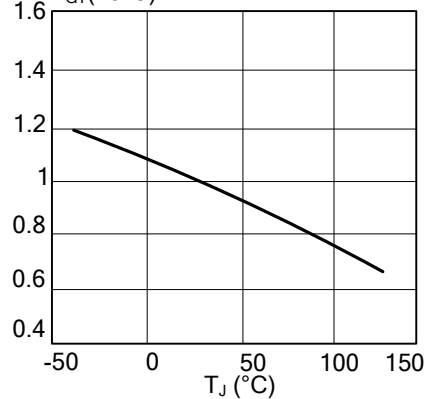
## ■ TYPICAL CHARACTERISTICS



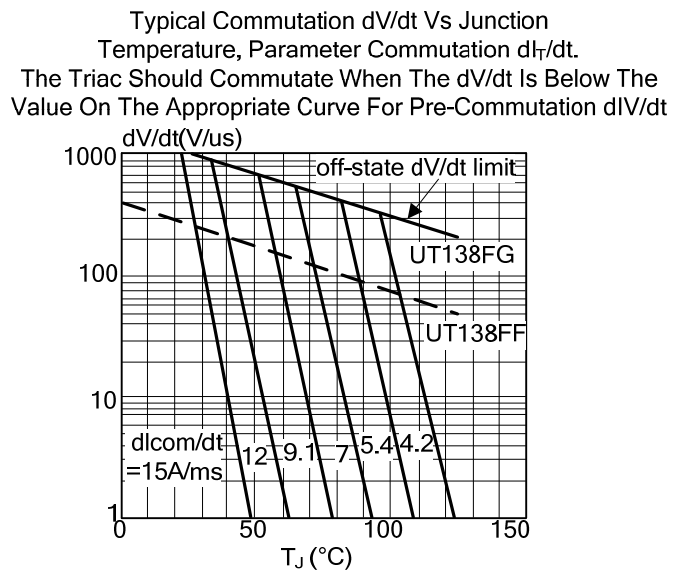
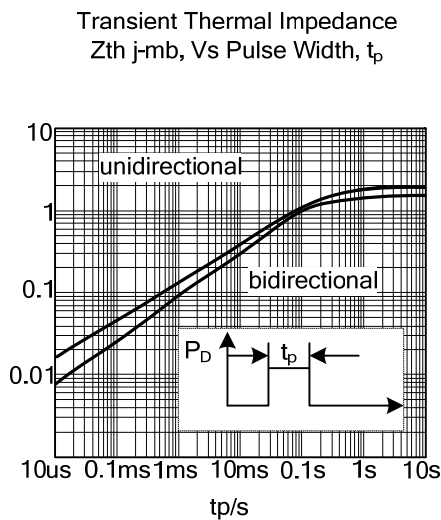
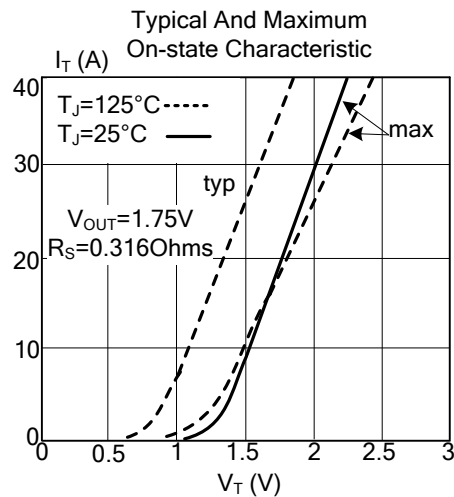
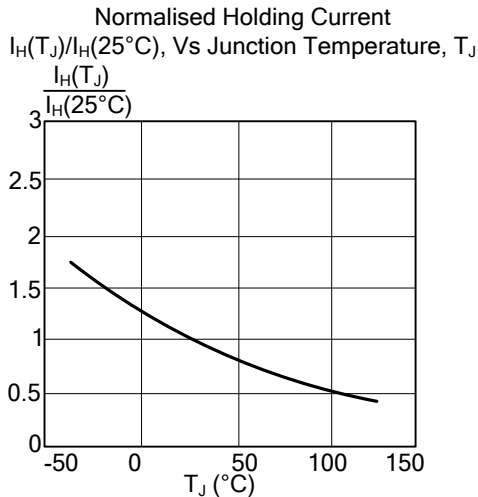
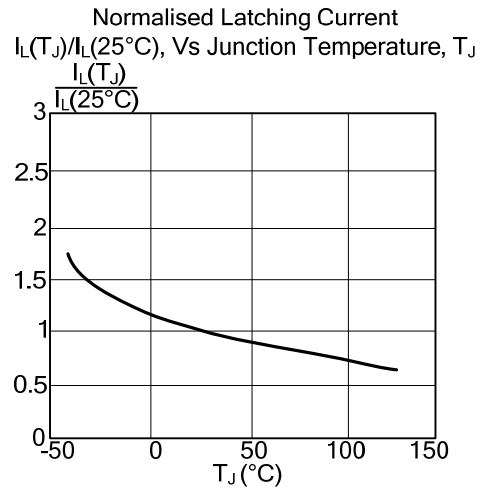
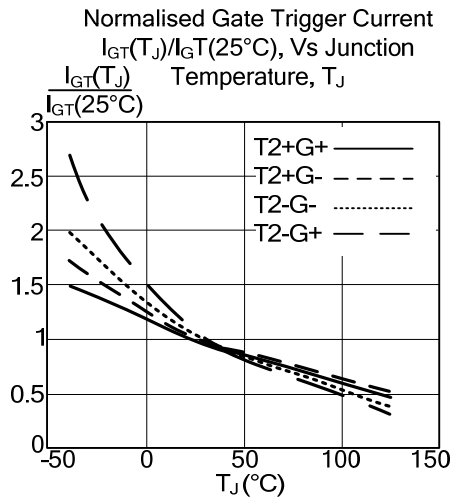
Maximum Permissible Repetitive RMS On-state Current  $I_{T(RMS)}$ , Vs Surge Duration, For Sinusoidal Currents,  $f=50Hz$ ,  $T_{MP} \leq 99^\circ C$



Normalised Gate Trigger Voltage  $V_{GT}(T_J)/V_{GT}(25^\circ C)$ , Vs Junction Temperature,  $T_J$



## ■ TYPICAL CHARACTERISTICS(Cont.)



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