Ultrafast Recovery Rectifiers

Primary characteristics		
Parameter	**Value**	**Unit**
$I_{T(RMS)}$	16	A
V_{DRM}	500/600/800	V
V_T	1.6	V

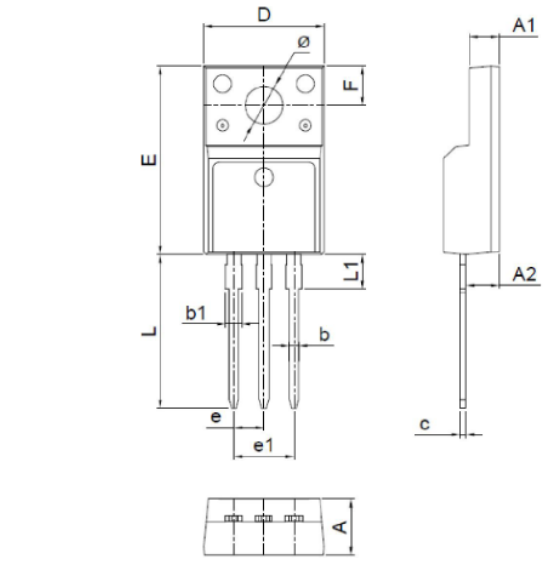
Features

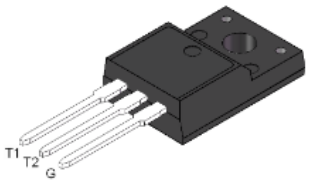
- **TO-220F** case for easy automatic insertion
- Pb-free and **RoHS** compliant
- Glass passivated
- Plastic envelope
- High bidirectional transient and blocking voltage capability
- High thermal cycling performance

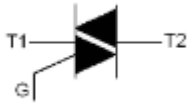
Applications

- Motor control
- Industrial and domestics lighting
- Heating

Case dimensions







TO-220F

	A	A_1	A_2	b	b_1	c	D	E	e	e_1	F
TYP	**4.7**	**2.54**	**2.76**	**0.80**	**1.34**	**0.5**	**10.16**	**15.90**	**2.54**	**5.08**	**3.3**
MIN	4.5	2.34	2.66	0.75	1.24	0.4	10.00	15.75	2.44	4.88	3.1
MAX	4.9	2.74	2.86	0.85	1.44	0.6	10.32	16.05	2.64	5.28	3.5

	L	L_1	ϕ	
TYP	**13.2**	**3.1**	**3.2**	All measurements in mm
MIN	12.9	2.9	3.1	
MAX	13.5	3.3	3.3	

Part numbering system

BT	139	-	800	E
↓	↓		↓	↓
Series code	$I_{T(RMS)}$=16A		500: V_{DRM}/V_{RRM}≥500V 600: V_{DRM}/V_{RRM}≥600V 800: V_{DRM}/V_{RRM}≥800V	E: I_{GT1-3}≤15-25mA, I_{GT4}≤40mA

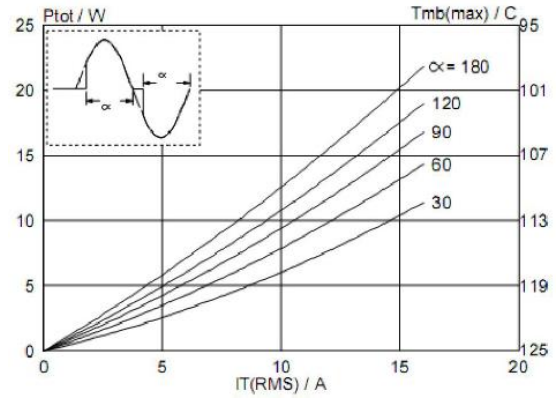
Maximum ratings (per leg, T_a = 25°C)						
Parameter	**Conditions**		**Symbol**	**Value**		**Unit**
				Min	**Max**	
Repetitive peak off-state voltages			V_{DRM}		500/600/800	V
ON-state RMS current	Full sine wave; T_{mb}<99°C		$I_{T(RMS)}$		16	A
Non-repetitive peak on-state current	Full sine wave; T_J=25°C prior to surge	t=20ms	I_{TSM}		140	A
		t=16.7ms			150	
I^2t for fusing	t=10ms		I^2t		98	A^2s
Repetitive rate of rise of on-state current after triggering	I_{TM}=20A; I_G=0.2A; dI_G/dt=200mA /µs	T2+, G+	dk/dt		50	A/µs
		T2+, G-			50	
		T2-, G-			50	
		T2-, G+			10	
Peak gate current			I_{GM}		2.0	A
Peak gate voltage			V_{GM}		5.0	V
Peak gate power			P_{GM}		5.0	W
Average gate power	over any 20ms period		$P_{G(AV)}$		500	mW
Operating junction temperature range			T_j		125	°C
Storage temperature range			T_{STG}	-40	150	°C

Thermal resistances						
Parameter	**Conditions**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Thermal resistance, junction to mounting base	full cycle half cycle	$R_{th\ j\text{-}mb}$			1.2 1.7	K/W
Thermal resistance, junction to ambient	in free air	$R_{th\ j\text{-}a}$		60		K/W

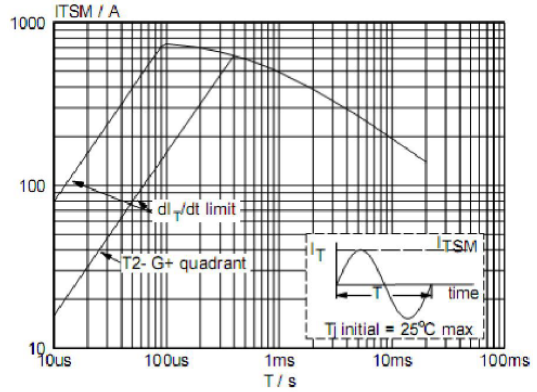
Static characteristics T_j=25°C unless otherwise stated							
Parameter	**Conditions**		**Symbol**	**Value**			**Unit**
				Min.	**Typ.**	**Max.**	
Gate trigger current	V_D=12V, I_T=100mA	T2+ G+	I_{GT}			35	mA
		T2+ G-				35	
		T2- G-				35	
		T2- G+				50	
Latching current	V_D=12V, I_T=100mA	T2+ G+	I_{GT}			50	mA
		T2+ G-				50	
		T2- G-				50	
		T2- G+				60	
Holding current	V_D=12V, I_{GT}=100mA		I_H			50	mA
ON-state voltage	I_T=20A		V_T			1.6	V
Gate trigger voltage	V_D=12V, I_T=100mA, T_j=125°C		V_{GT}			1.5	V
	V_D=400V, I_T=100mA, T_j=125°C			0.25	0.4		
OFF-state leakage current	V_D=$V_{DRM(max)}$, T_j=125°C		I_D		0.1	0.5	mA

Static characteristics T_j=25°C unless otherwise stated						
Parameter	**Conditions**	**Symbol**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Critical rate of rise of OFF-state voltage	V_{DM}=67%, $V_{DRM(max)}$, T_j=125°C, exp. onential waveform, gate: open circuit	dV_D/dt	50			V/µs
Critical rate of change of commutating voltage	V_{DM}=400V, T_j=95°C, $I_{T(RMS)}$=12A, dIcom/dt=5.4A/ms, gate open circuit	$^{dv}com/^{dt}$		20		V/µs
Gate controlled turn-ON time	I_{TM}=16A, V_D=$V_{DRM(max)}$, I_G=100mA, dI_G/dt=5.0A/ps	t_{gt}		2.0		µs

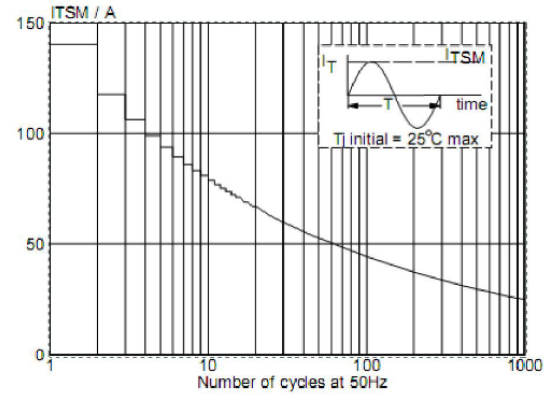
Maximum ON-state dissipation, P_{tot}, vs RMS ON-state current, $I_{T(RMS)}$, where α=conduction angle



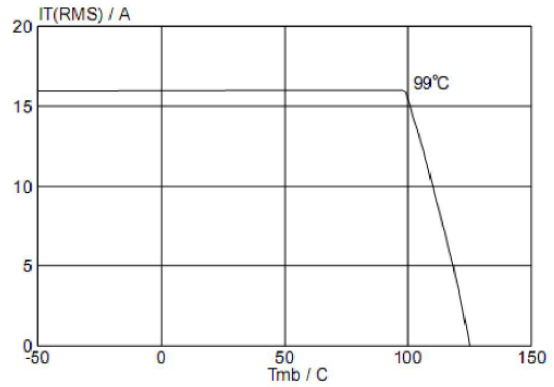
Maximum permissible non-repetitive peak on-state current I TSM, versus pulse width tp, for sinusoidal currents, tp ≤20ms.



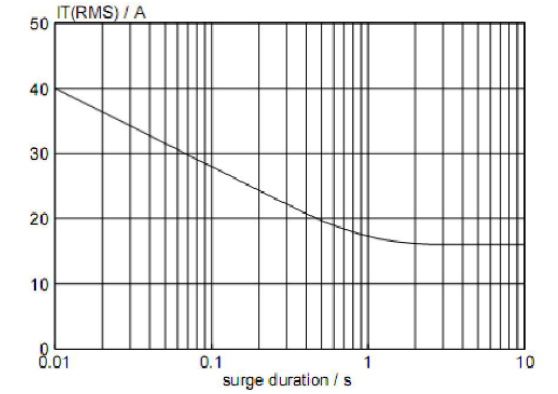
Maximum permissible non-repetitive peak ON-state current I_{TSM}, vs number of cycles, for sinusoidal currents, f=50Hz.



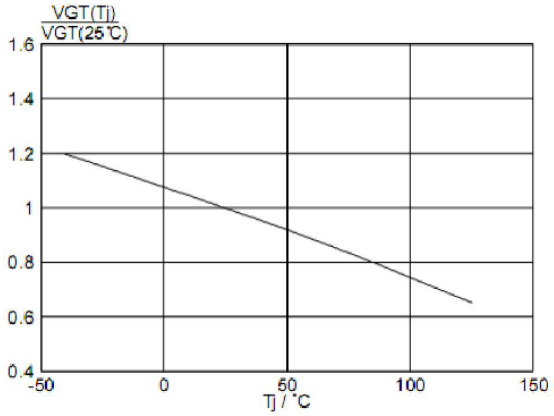
Maximum permissible RMS current $I_{T(RMS)}$, vs lead temperature T_{lead}



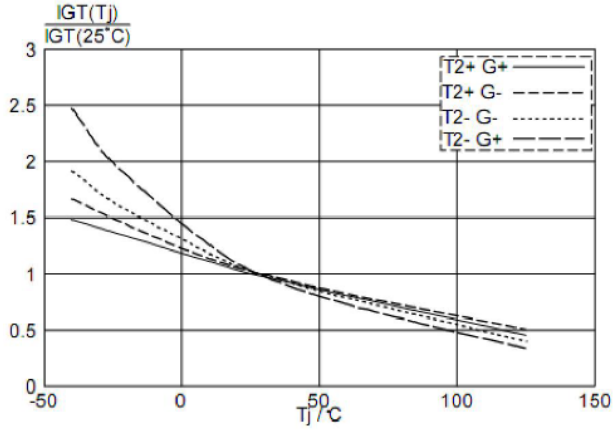
Maximum permissible repetitive RMS ON-state current $I_{T(RMS)}$, vs surge duration, for sinusoidal currents, f=50Hz; T_{mb}≤99°C



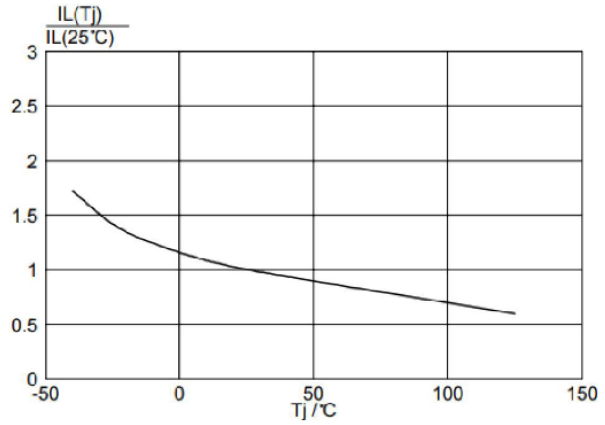
Normalised gate trigger voltage $V_{GT}(Tj)/V_{GT}(25°C)$, vs junction temperature Tj



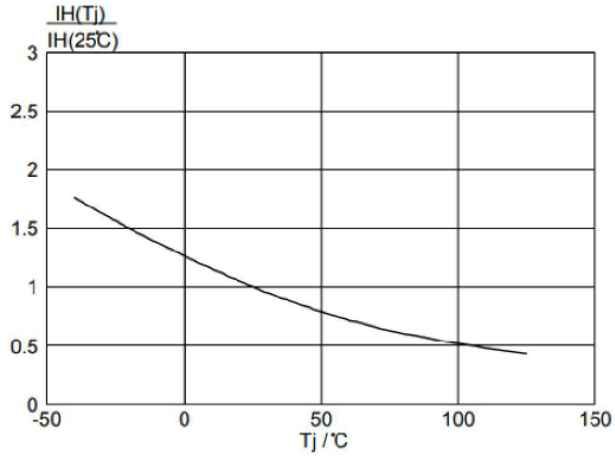
Normalised gate trigger current $I_{GT}(Tj)/I_{GT}(25°C)$, vs junction temperature T_j



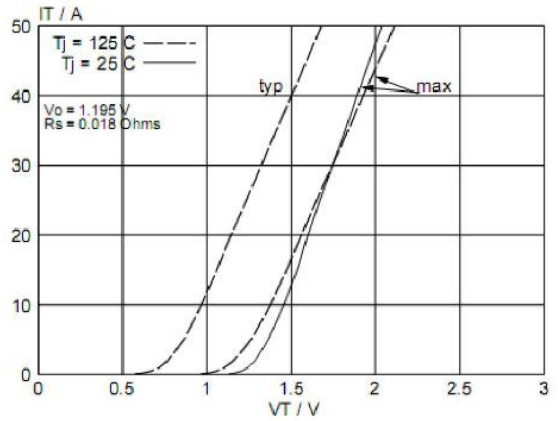
Normalised latching current $I_L(Tj)/I_L(25°C)$ vs junction temperature T_j



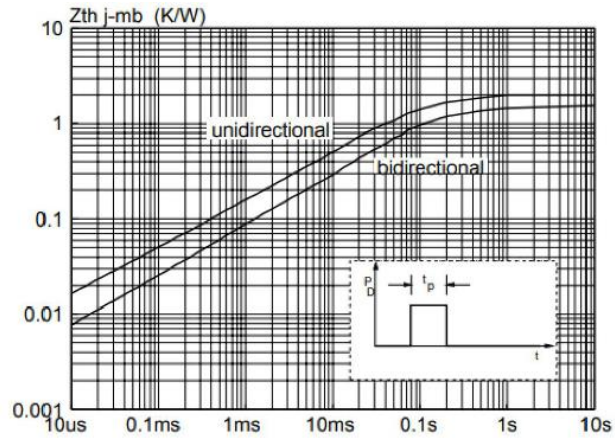
Normalised holding current $I_H(Tj)/I_H(25°C)$, vs junction temperature T_j



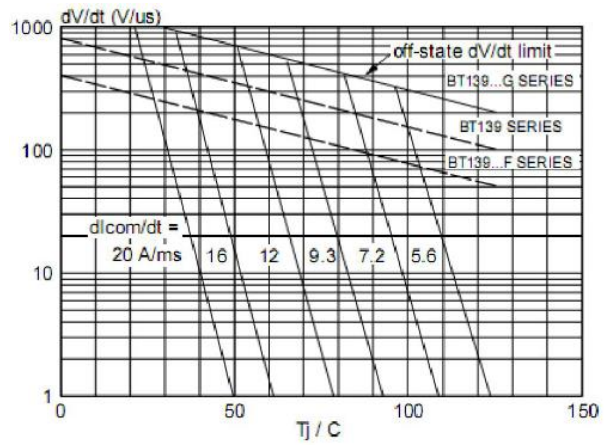
Typical and maximum ON-state characteristic



Transient thermal impedance Z_{th} j-lead, vs pulse width t_p



Typical, critical rate of rise of OFF-state voltage, dV/dt vs junction temperature T_j



Ordering information			
Part Number	**Package**	**Marking**	**Shipping Quantity**
BT139-500E	TO-220F	BT139 500 XXXX	**1000 pcs / box**
BT139-600E		BT139 600 XXXX	**1000 pcs / box**
BT139-800E		BT139 800 XXXX	**1000 pcs / box**

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