BTA41-1600E

1600V 41A RMS Silicon High Power Three-Quadrant TRIAC

This device is a high-voltage, high-current three-quadrant thyristor operating in Quadrants I, II and III. Its structure enables reliable triggering under three main-terminal and gate polarity combinations, providing controlled bidirectional conduction for line-frequency AC operation.



Package view and circuit symbol—**(TO-3PF)**

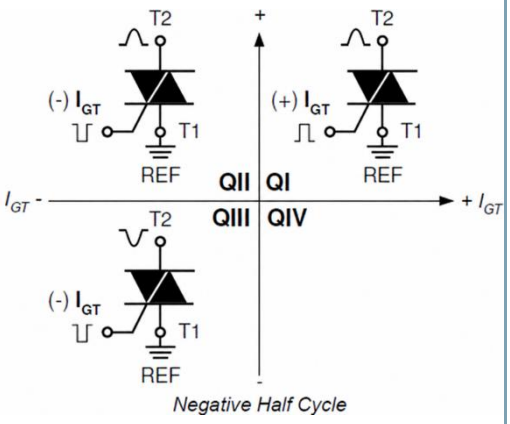
General Features

- Three-quadrant operation: QI, QII and QIII
- High surge capability
- High repetitive peak blocking voltage
- High junction operating temperature
- High static dv/dt capability
- Low on-state voltage drop
- RoHS compliant

Applications

- Line-frequency phase control (50/60 Hz)
- Heating and temperature regulation
- AC motor soft-start and speed control
- Induction motor and fan control
- Lighting and phase-control systems
- Power converters and AC switches

Key Performance Parameters

Parameter	Value	Unit	Three-Quadrant Operation
V_{DRM}/ V_{RRM} min @ $T_{J\ =\ 25\ °C}$	**1600**	V	
T_J, maximum junction temperature	**150**	°C	
$I_{T(RMS)}$ @ $T_{C\ =\ 70\ °C,\ 360°\ conduction,\ full\text{-}sine}$	**41**	A	
I_{TSM} @ $T_{J\ =\ 25\ °C,\ full\ cycle,tp\ =\ 20\ ms}$	**410**	A	
$V_{T.TYP}$ @ $I_{T=41A,\ tp=380\mu s}$	**1.6**	V	
$I_{GT.MAX}$@ $V_{D=12V}$ (Ⅰ/Ⅱ/Ⅲ)	**50**	mA	
$V_{GT.MAX}$@ $V_{D=12V}$	**1.3**	V	

Marking Information

Product Name	Package	Marking
BTA41-1600E	TO-3PF	BTA41-1600E

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Maximum Ratings (T_J = 25℃, unless otherwise noted)

Parameter		Symbol	Value	Unit
Repetitive Peak off-state Voltage	T_J=25℃	V_{DRM}	1600	V
Repetitive Peak Reverse Voltage	T_J=25℃	V_{RRM}	1600	V
On-State RMS Current(Silicon limit)	T_C=70℃, 360° conduction, full-sine wave	$I_{T(RMS)}$	41	A
On-State Average Current		$I_{T(AV)}$	37	A
Peak Non-Repetitive Surge Current	T_J=25℃, full-sine wave t=20ms,f=50Hz	I_{TSM}	410	A
	T_J=25℃, full-sine wave, t=16.7ms,f=60Hz		440	
I^2t for fusing	T_J=25℃, full-sine wave t=20ms,f=50Hz	I^2t	840	A^2s
	T_J=25℃, full-sine wave, t=16.7ms,f=60Hz		803	
Critical Rate of Rise of On-State Current	T_J= T_{Jmax}, f=100Hz I_T=90A,I_G=2 x I_{GT}	$(di/dt)_{cr}$	100	A/μs
Peak Gate Current		I_{GM}	8	A
Average Gate Power Dissipation		$P_{G(AV)}$	0.5	W
Peak Gate Power		P_{GM}	40	
Total Power Dissipation	T_C=25℃	P_{tot}	125	
Operating Junction and Storage Temperature Range		T_J,T_{stg}	-40 To +150	℃

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case(DC)	R_{thJC}	1	℃/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	60	

Electrical Characteristics (T_J = 25℃, unless otherwise noted)

Parameter	Symbol	Test Condition		Value			Unit
				min.	typ.	max.	
Maximum Off-State Leakage Current	I_{DRM}/I_{RRM}	$V=V_{DRM}/V_{RRM}$	T_J=25℃	-	-	20	μA
		$V=V_{DRM}/V_{RRM}$	T_J=125℃	-	-	8	mA
On-State Voltage	V_T	T_J=25℃,I_T=20A,t_p=380μs		-	1.3	1.5	V
		T_J=125℃,I_T=20A,t_p=380μs		-	1.25	-	
		T_J=25℃,I_T=41A,t_p=380μs		-	1.6	1.8	
		T_J=125℃,I_T=41A,t_p=380μs		-	1.55	-	
Threshold Voltage	$V_{T(TO)}$	T_J=125℃		-	-	0.78	V
Slope Resistance	r_t			-	-	27	mΩ
Gate Trigger Current	I_{GT}	V_D=12V,R_L=33Ω	Ⅰ-Ⅱ-Ⅲ	-	30	50	mA
Gate Trigger Voltage	V_{GT}			-	1	1.3	V
Gate non-trigger Voltage	V_{GD}			0.2	-	-	V
Latching Current	I_L	T_J=25℃, tp=10μs, I_G=1.2I_{GT}, di_G/dt=0.3A/us	Ⅰ-Ⅲ	-	-	80	mA
			Ⅱ	-	-	200	
Holding Current	I_H	T_J=25℃, V_D=12V,I_T=1A resistive load,R_{GK} = open		-	-	100	
Critical Rate of Rise of Off-State Voltage	$(dv/dt)_{cr}$	$T_J=T_{Jmax}$,V=2/3V_{DRM}, linear voltage rise, R_{GK}=Open		1500	-	-	V/μs
Critical Rate of Rise of Commutation Voltage	$(dv/dt)_c$	$(di/dt)_c$=25A/ms, $T_J=T_{Jmax}$		20	-	-	V/μs

Typical Performance Characteristics（Q：Ⅰ-Ⅱ-Ⅲ）

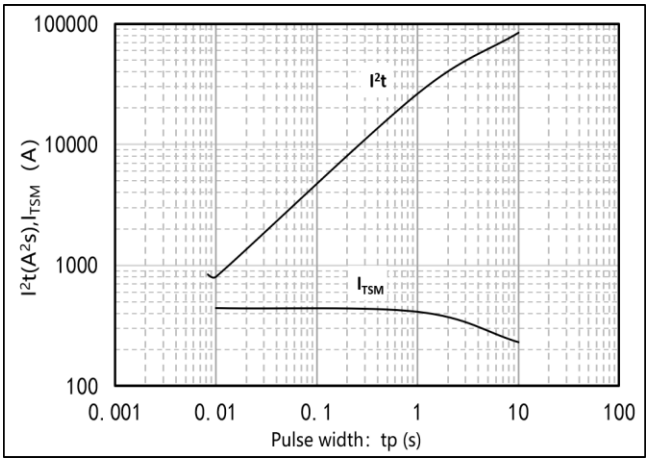


Fig 1. I^2t & Surge Current versus time

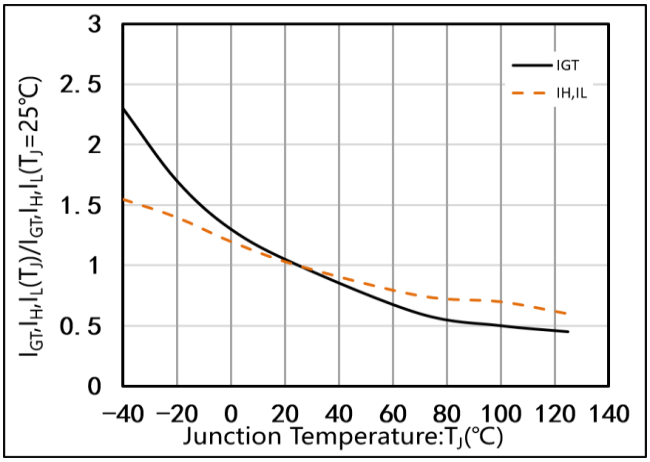


Fig 2. I^2t versus time

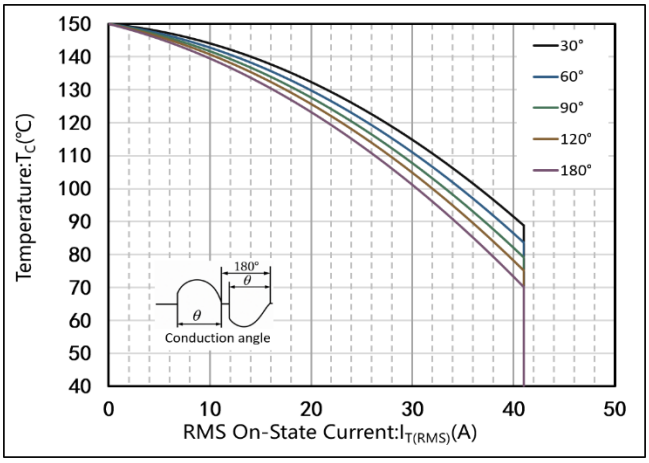


Fig 3. Current Rating Characteristics

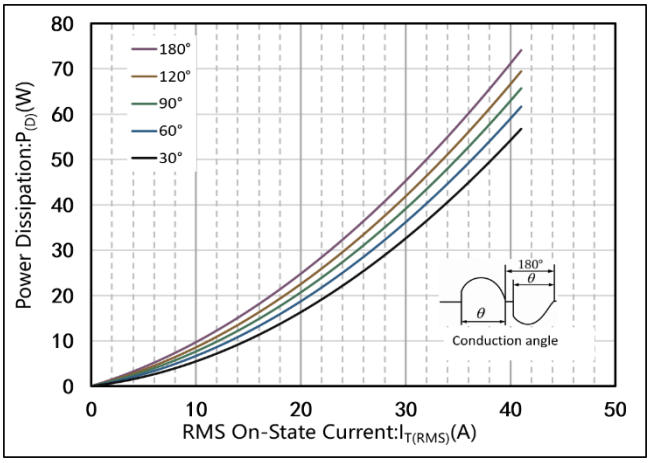


Fig 4. Power Loss Characteristic

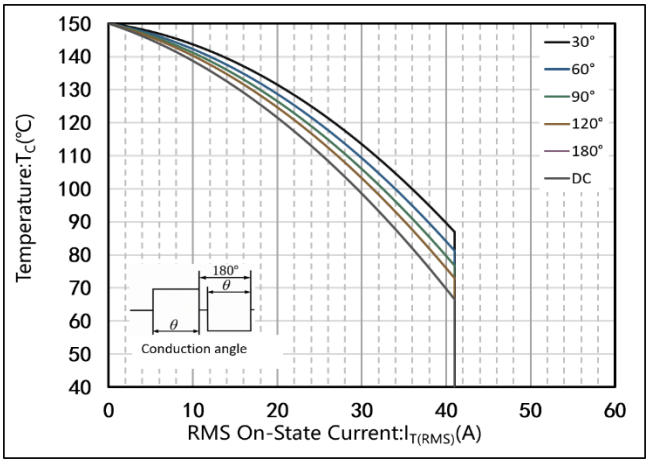


Fig 5. Current Rating Characteristics

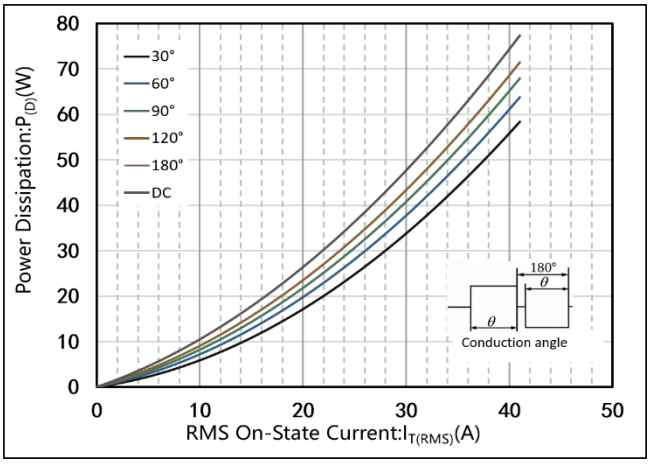


Fig 6. Power Loss Characteristic

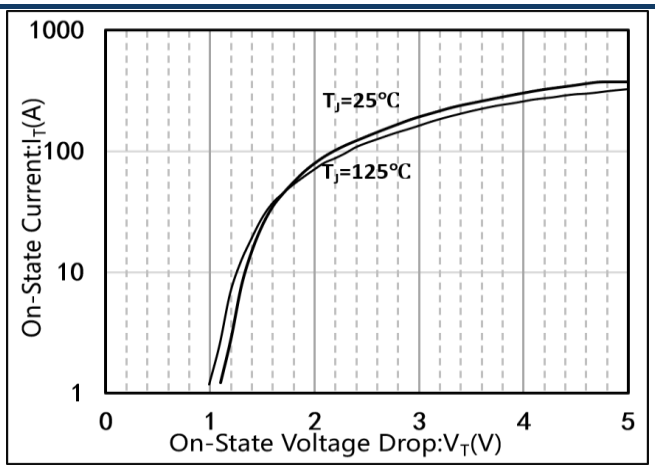


Fig 7.On-State Characteristics

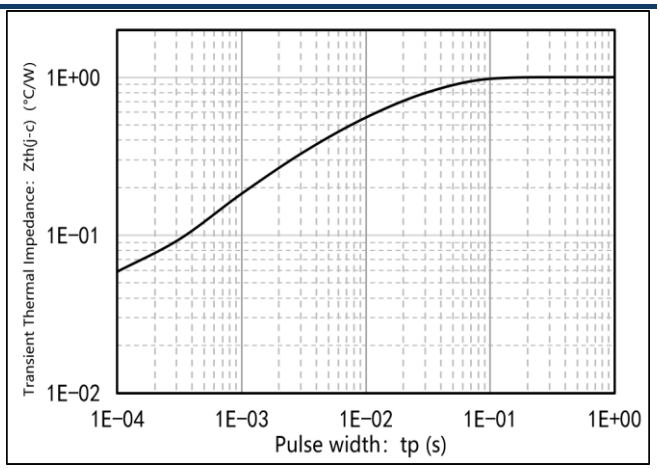
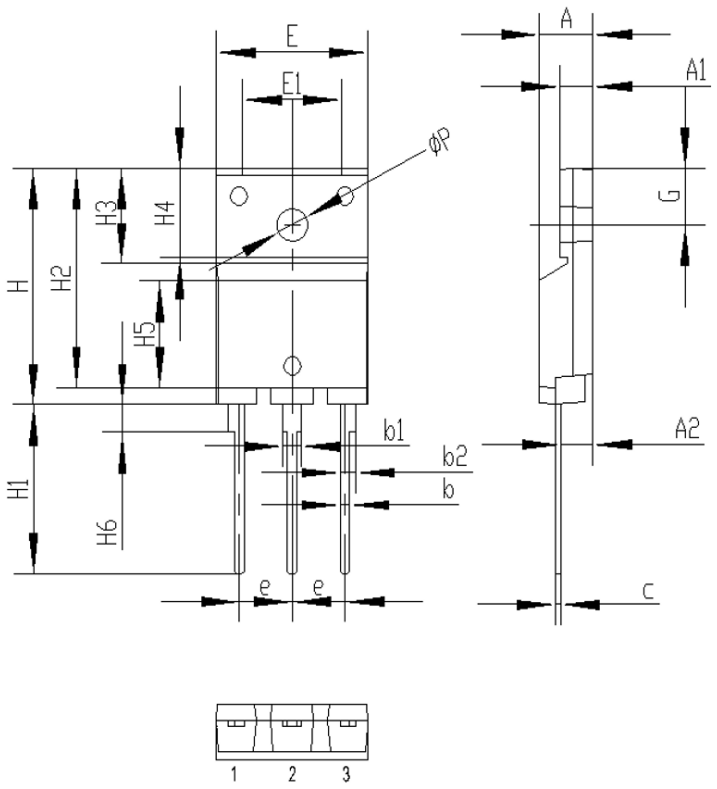


Fig 8. Transient Thermal Impedance

Package Information



Symbol	单位 mm		
	Min	Nom	Max
A	5.30	5.50	5.70
A1	3.30	3.50	3.70
A2	3.10	3.30	3.50
b	0.80	1.0	1.20
b1	1.90	2.10	2.30
b2	1.60	1.80	2.00
c	0.40	0.50	0.60
e	5.25	5.45	5.65
E	15.4	15.6	15.8
E1	10.0	10.2	10.4
H	22.8	23.0	23.2
H1	16.0	16.5	17.0
H2	21.2	21.4	21.6
H3	9.10	9.30	9.50
H4	8.40	8.60	8.80
H5	10.1	10.3	10.5
H6	2.75	2.90	3.05
G	5.3	5.5	5.7
ΦP	3.00	3.20	3.40

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