BTA216-600BT

Triacs high commutation

Rev. 2 — 9 November 2011 Product data sheet

1. Product profile

1.1 General description

Passivated high commutation triac in a plastic envelope. Featuring high maximum junction temperature and high commutation capability. Intended for use in circuits where high static and dynamic dV/dt and high dI/dt can occur. This device will commutate the full rated RMS current at the maximum rated junction temperature, without the aid of a snubber.

1.2 Features and benefits

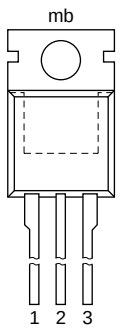
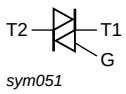
- High maximum junction temperature
- High commutation capability

1.3 Quick reference data

- $V_{DRM} \leq 600$ V
- $I_{GT} \leq 50$ mA
- $T_j \leq 150$ °C
- $I_{T(RMS)} \leq 16$ A
- $I_{TSM} \leq 140$ A
- $dI_{com}/dt = 18$ A/ms

2. Pinning information

Table 1: Pinning

Pin	Description	Simplified outline	Symbol
1	main terminal 1 (T1)		
2	main terminal 2 (T2)		
3	gate (G)		
mb	mounting base [1]		

SOT78 (TO-220AB)

[1] Connected to main terminal 2 (T2)

3. Ordering information

Table 2: Ordering information

Type number	Package		
	Name	Description	Version
BTA216-600BT	TO-220AB	plastic single-ended package; heatsink mounted; 3 leads; 1 mounting hole	SOT78

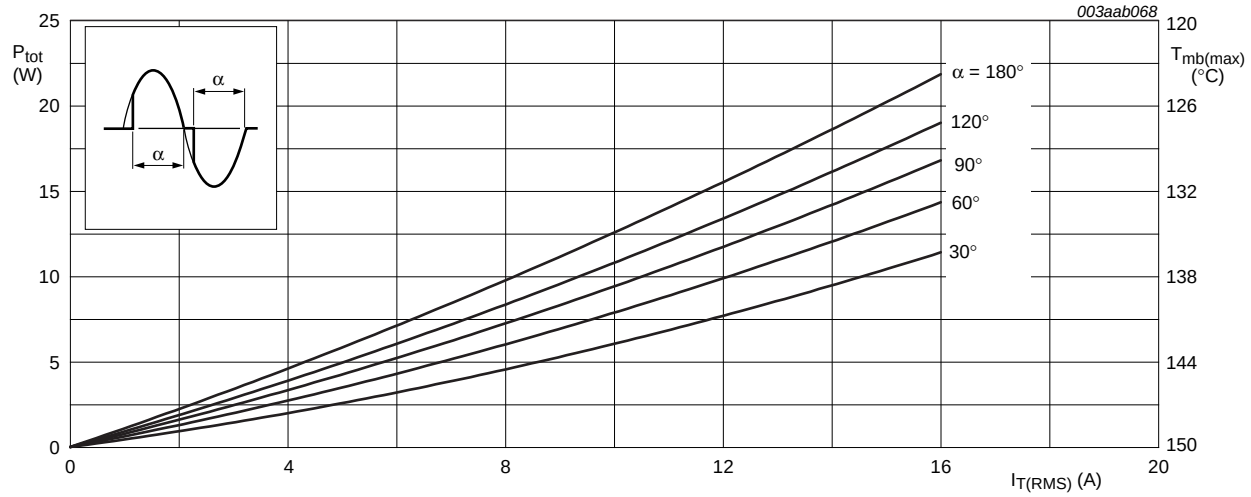
4. Limiting values

Table 3: Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

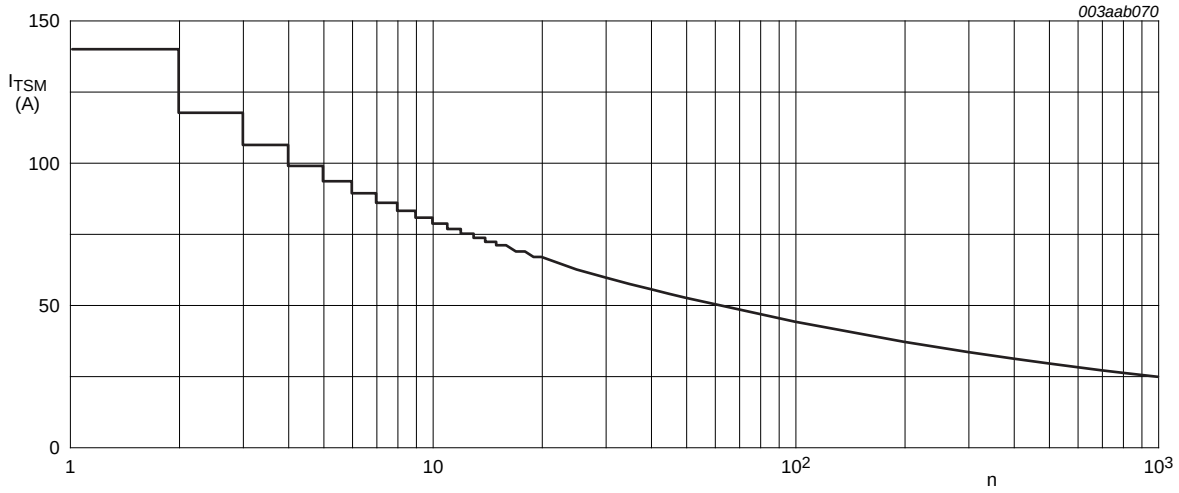
Symbol	Parameter	Conditions		Min	Max	Unit
V_{DRM}	repetitive peak off-state voltage		[1]	-	600	V
$I_{T(RMS)}$	RMS on-state current	full sine wave; $T_{mb} \leq 124$ °C; see Figure 4 and 5		-	16	A
I_{TSM}	non-repetitive peak on-state current	full sine wave; T_j = 25 °C prior to surge; see Figure 2 and 3				
		t = 20 ms		-	140	A
		t = 16.7 ms		-	150	A
I^2t	I^2t for fusing	t = 10 ms		-	98	A^2s
dI_T/dt	rate of rise of on-state current	I_{TM} = 20 A; I_G = 0.2 A; dI_G/dt = 0.2 A/µs		-	100	A/µs
I_{GM}	peak gate current			-	2	A
V_{GM}	peak gate voltage			-	5	V
P_{GM}	peak gate power			-	5	W
$P_{G(AV)}$	average gate power	over any 20 ms period		-	0.5	W
T_{stg}	storage temperature			–40	+150	°C
T_j	junction temperature			-	150	°C

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



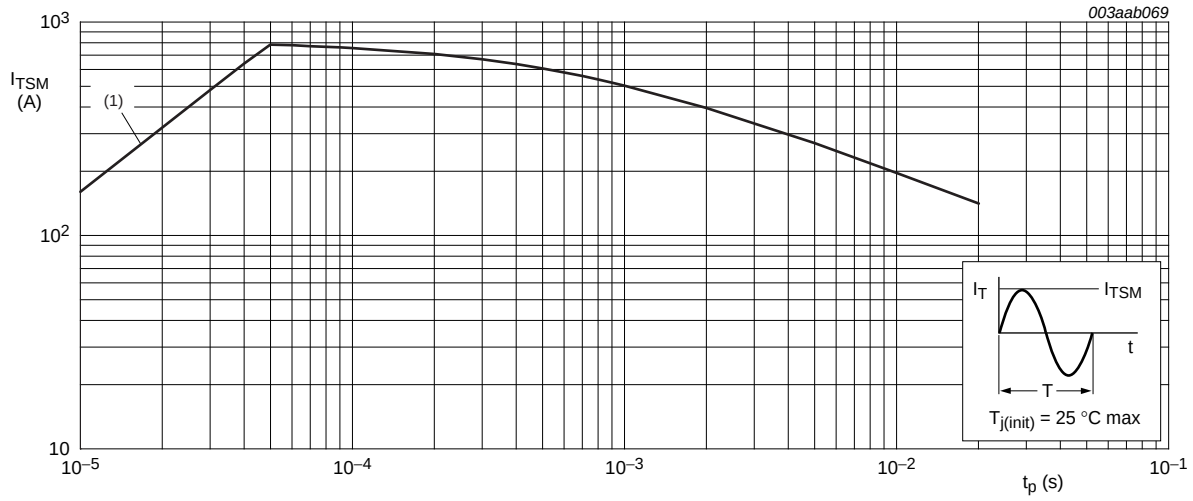
α = conduction angle

Fig 1. On-state power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

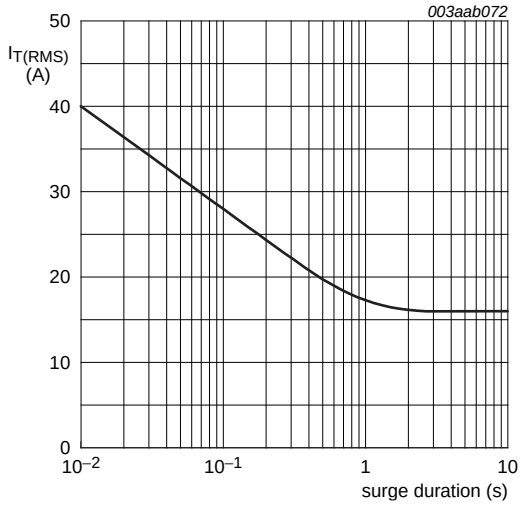
Fig 2. Non-repetitive peak on-state current as a function of number of half cycles; sinusoidal currents; maximum values



$t_p \leq 20$ ms

(1) dI_T/dt limit

Fig 3. Non-repetitive peak on-state current as a function of pulse width; sinusoidal currents; maximum values



f = 50 Hz; $T_{mb} \leq 131$ °C

Fig 4. RMS on-state current as a function of surge duration; sinusoidal currents; maximum values

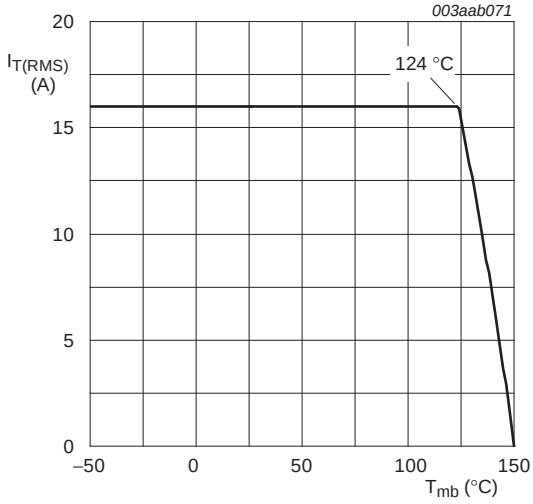
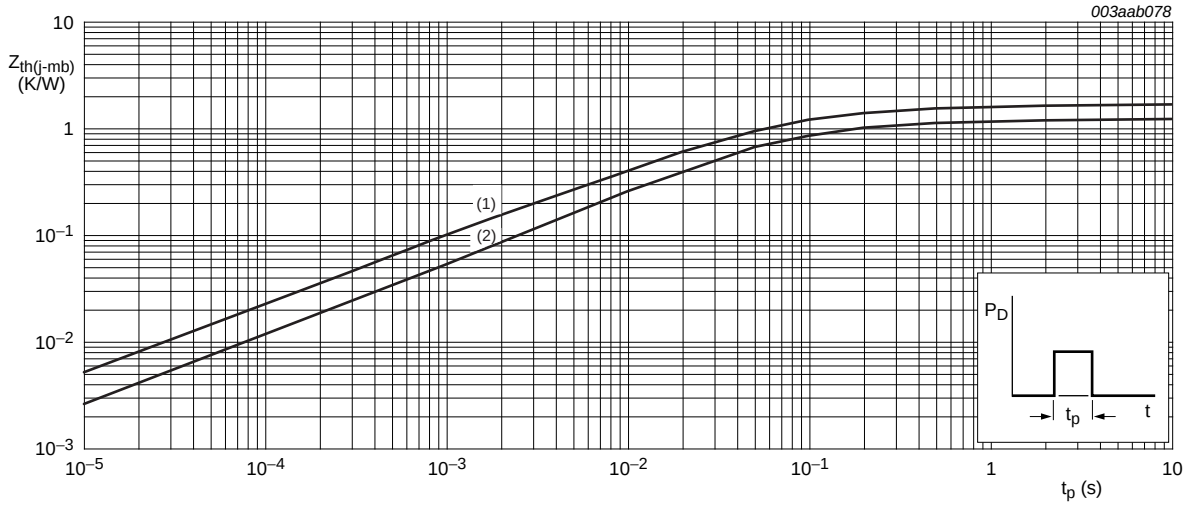


Fig 5. RMS on-state current as a function of mounting base temperature; maximum values

5. Thermal characteristics

Table 4: Thermal characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$R_{th(j-mb)}$	thermal resistance from junction to mounting base	full cycle; see Figure 6	-	-	1.2	K/W
		half cycle; see Figure 6	-	-	1.7	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient	in free air	-	60	-	K/W



(1) half cycle

(2) full cycle

Fig 6. Transient thermal impedance from junction to mounting base as a function of pulse width

6. Static characteristics

Table 5: Static characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; see Figure 8	[1]				
		T2+ G+		2	18	50	mA
		T2+ G–		2	21	50	mA
		T2– G–		2	34	50	mA
I_L	latching current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 10					
		T2+ G+		-	31	60	mA
		T2+ G–		-	34	90	mA
		T2– G–		-	30	60	mA
I_H	holding current	V_D = 12 V; I_{GT} = 0.1 A; see Figure 11		-	31	60	mA
V_T	on-state voltage	I_T = 20 A; see Figure 9		-	1.2	1.5	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; see Figure 7		-	0.7	1.5	V
		V_D = 400 V; I_T = 0.1 A; T_j = 150 °C		0.25	0.4	-	V
I_D	off-state current	$V_D = V_{DRM(max)}$; T_j = 150 °C		-	0.5	3	mA

[1] Device does not trigger in the T2– G+ quadrant.

7. Dynamic characteristics

Table 6: Dynamic characteristics

T_j = 25 °C unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 0.67$V_{DRM(max)}$; T_j = 150 °C; exponential waveform; gate open circuit	500	1500	-	V/µs
dI_{com}/dt	rate of change of commutating current	V_{DM} = 400 V; T_j = 150 °C; $I_{T(RMS)}$ = 16 A; without snubber; gate open circuit; see Figure 12	9	18	-	A/ms
t_{gt}	gate-controlled turn-on time	I_{TM} = 20 A; V_D = $V_{DRM(max)}$; I_G = 0.1 A; dI_G/dt = 5 A/µs	-	2	-	µs

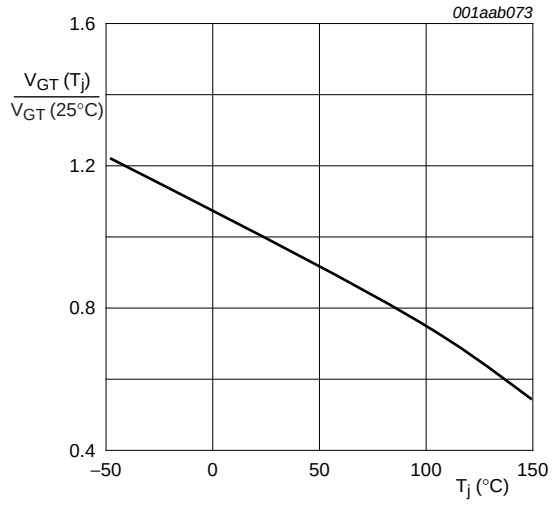
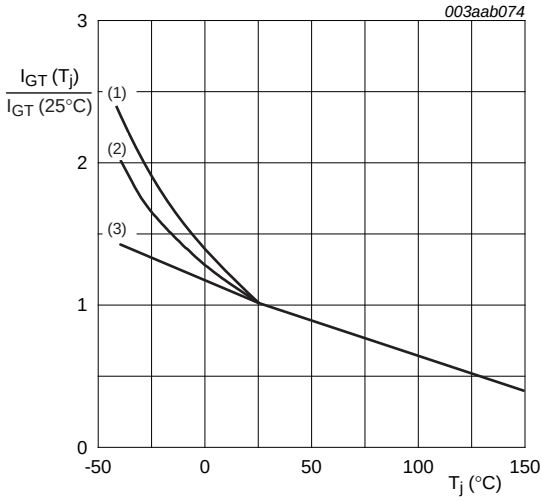


Fig 7. Normalized gate trigger voltage as a function of junction temperature

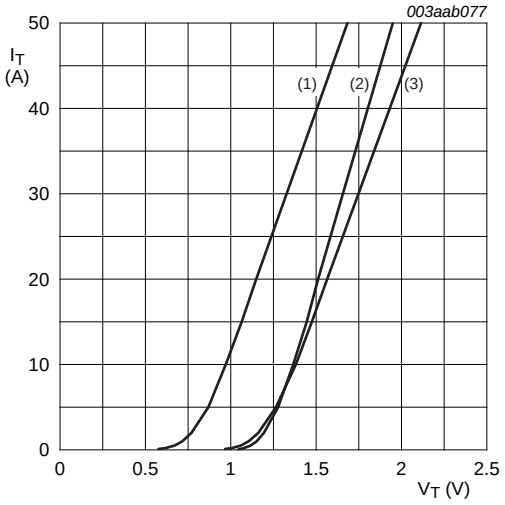


(1) T2– G–

(2) T2+ G–

(3) T2+ G+

Fig 8. Normalized gate trigger current as a function of junction temperature



V_O = 1.195 V; R_S = 18 mΩ

(1) T_j = 150 °C; typical values

(2) T_j = 25 °C; maximum values

(3) T_j = 150 °C; maximum values

Fig 9. On-state characteristic

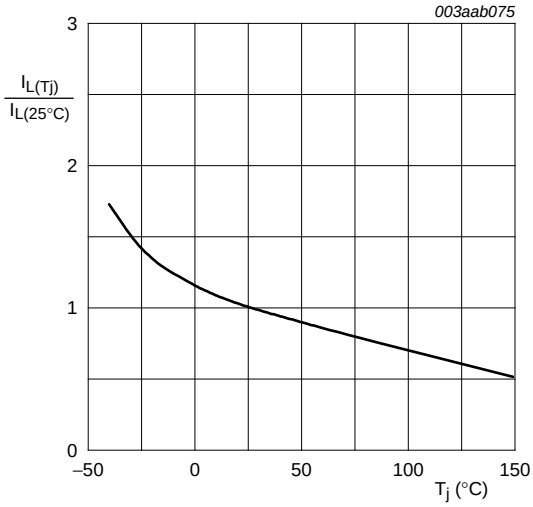


Fig 10. Normalized latching current as a function of junction temperature

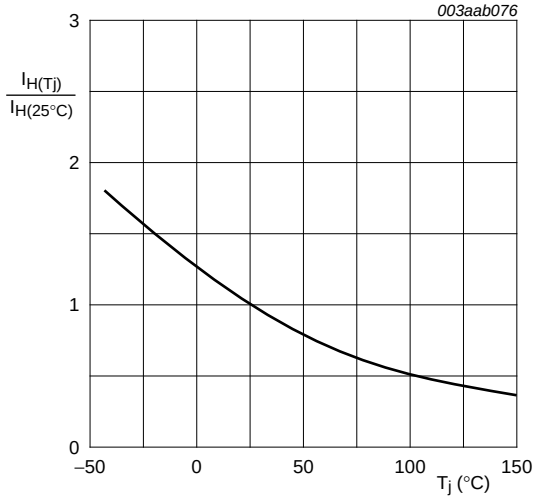


Fig 11. Normalized holding current as a function of junction temperature

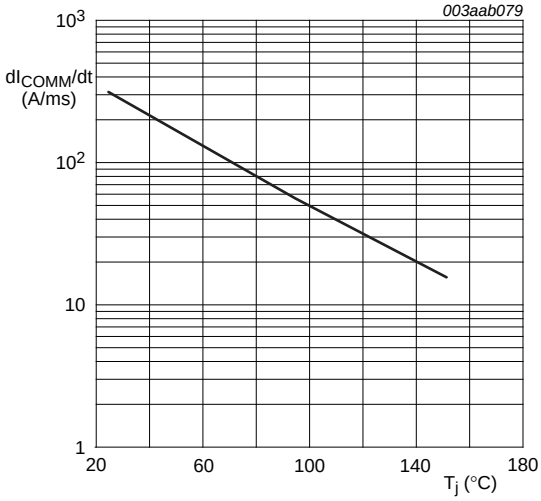


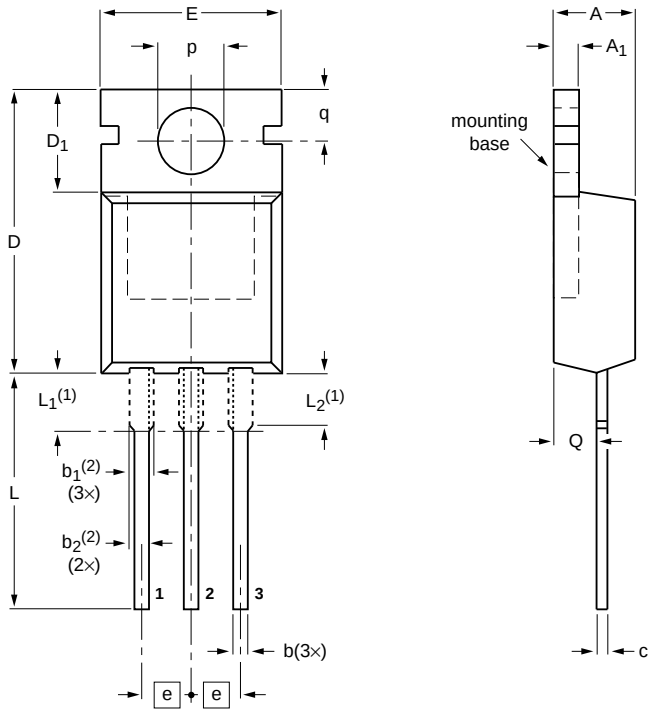
Fig 12. Rate of change of commutating current as a function of junction temperature; typical values

8. Package information

Plastic meets UL94 V-0 at 1/8 inch.

9. Package outline

Plastic single-ended package; heatsink mounted; 1 mounting hole; 3-lead TO-220AB **SOT78**



DIMENSIONS (mm are the original dimensions)

UNIT	A	A_1	b	b_1(2)	b_2(2)	c	D	D_1	E	e	L	L_1(1)	L_2(1) max.	p	q	Q
mm	4.7 4.1	1.40 1.25	0.9 0.6	1.6 1.0	1.3 1.0	0.7 0.4	16.0 15.2	6.6 5.9	10.3 9.7	2.54	15.0 12.8	3.30 2.79	3.0	3.8 3.5	3.0 2.7	2.6 2.2

Notes

1. Lead shoulder designs may vary.
2. Dimension includes excess dambar.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	JEITA			
SOT78		3-lead TO-220AB	SC-46			~~08-04-23~~ 08-06-13

Fig 13. Package outline SOT78 (TO-220AB)

10. Revision history

Table 7. Revision history

Document ID	Release date	Data sheet status	Change notice	Supersedes
BTA216-600BT v.2	20111109	Product data sheet	-	BTA216-600BT v.1
Modifications:	• The format of this data sheet has been redesigned to comply with the new identity guidelines of NXP Semiconductors. • Legal texts have been adapted to the new company name where appropriate.			
BTA216-600BT v.1	20050825	Product data sheet	-	-

11. Legal information

11.1 Data sheet status

Document status[1][2]	Product status[3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

[1] Please consult the most recently issued document before initiating or completing a design.

[2] The term 'short data sheet' is explained in section "Definitions".

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