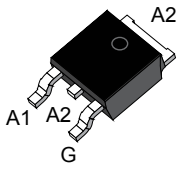
T1235-6B-TR

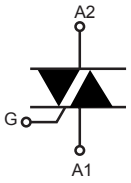
Datasheet

12 A - 600 V - 125 °C Snubberless Triac in DPAK



DPAK

A2: Anode2
A1: Anode1
G: Gate



Features

- 12 A medium current Triac
- High turn off commutation - (dI/dt)c
- High EMI immunity - static dV/dt
- Three triggering quadrants technology
- ECOPACK2 compliant

Applications

- Heating element control
- General purpose AC line load control
- Small home appliances
- Lighting control

Description

The T1235-6B-TR housed in DPAK fits compact design for power application thanks to a very strong ratio between power density and package size.

It can be used in general purpose AC switching where high commutation capability is required. Either on-off or phase angle control is achiveable with this product.

Based on the ST Snubberless technology, it offers an excellent turn off commutation and a high noise immunity levels up to the T_j max.

Product status link
T1235-6B-TR

Product summary	
$I_{T(RMS)}$	12 A
V_{DRM}/V_{RRM}	600 V
I_{GT}	35 mA
T_j	125 °C

1 Characteristics

Table 1. Absolute maximum ratings (limiting values)

Symbol	Parameter			Value	Unit
$I_{T(RMS)}$	On-state RMS current (full sine wave)		T_c = 108 °C	12	A
I_{TSM}	Non repetitive surge peak on-state current (T_j initial = 25 °C)		t = 20 ms	115	A
			t = 16.7 ms	120	
I^2t	I^2t value for fusing, (T_j initial = 25 °C)		t_p = 10 ms	77	A^2s
V_{DRM}/ V_{RRM}	Repetitive surge peak off-state voltage		T_j = 125 °C	600	V
dI/dt	Critical rate of rise of on-state current I_G = 2 x I_{GT}, tr ≤ 100 ns	f = 100 Hz	T_j = 125 °C	100	A/µs
I_{GM}	Peak gate current	t_p = 20 µs	T_j = 125 °C	4	A
$P_{G(AV)}$	Average gate power dissipation		T_j = 125 °C	1	W
T_{stg}	Storage junction temperature range			-40 to +150	°C
T_j	Operating junction temperature range			-40 to +125	°C

Table 2. Electrical characteristics (T_j = 25 °C unless otherwise specified)

Symbol	Test conditions			Value	Unit
I_{GT}	V_D = 12 V, R_L = 30 Ω	I - II - III	Max.	35	mA
V_{GT}	V_D = 12 V, R_L = 30 Ω	I - II - III	Max.	1.1	V
V_{GD}	V_D = V_{DRM}, R_L = 3.3 kΩ , T_j = 125 °C	I - II - III	Min.	0.2	V
I_H (1)	I_T = 500 mA		Max.	40	mA
I_L	I_G = 1.2 x I_{GT}	I - III	Max.	60	mA
		II		65	
dV/dt(1)	V_D = 402 V, gate open	T_j = 125 °C	Min.	2000	V/µs
(dI/dt)c(1)	Without snubber network	T_j = 125 °C	Min.	12	A/ms

1. *For both polarities of A2 referenced to A1*

Table 3. Static characteristics

Symbol	Test conditions			Value	Unit
V_{TM} (1)	I_{TM} = 17 A, t_p = 380 µs	T_j = 25 °C	Max.	1.45	V
V_{TO}(1)	Threshold voltage	T_j = 125 °C	Max.	0.85	
R_D(1)	Dynamic resistance	T_j = 125 °C	Max.	30	mΩ
I_{DRM}, I_{RRM}	V_D = V_R = V_{DRM} = V_{RRM}	T_j = 25 °C	Max.	5	µA
		T_j = 125 °C		2	mA

1. *For both polarities of A2 referenced to A1*

Table 4. Thermal parameters

Symbol	Parameter		Value	Unit
$R_{th(j-c)}$	Junction to case (AC)	Max.	1.2	°C/W
$R_{th(j-a)}$	Junction to ambient, S=1cm²(1)	Typ.	70	°C/W

1. *S= copper surface under tab*

1.1 Characteristics curves

Figure 1. Maximum power dissipation versus on-state RMS current (full cycle)

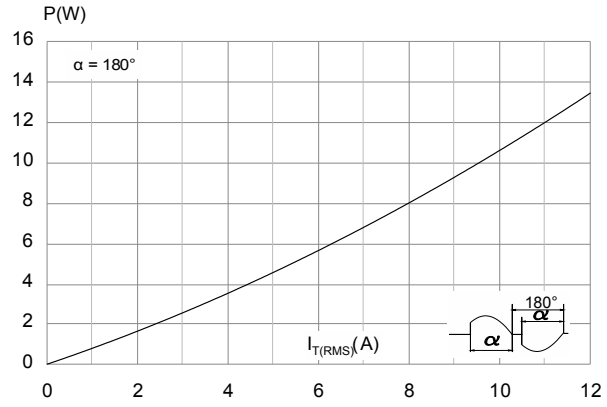


Figure 2. On-state RMS current versus case temperature (full cycle)

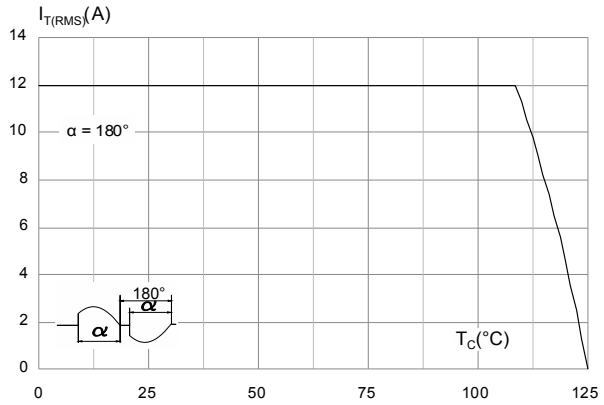


Figure 3. On-state RMS current versus ambient temperature (free air convection)

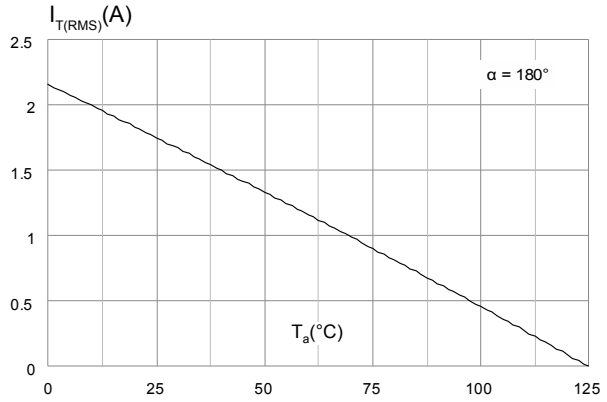


Figure 4. On-state characteristics (maximum values)

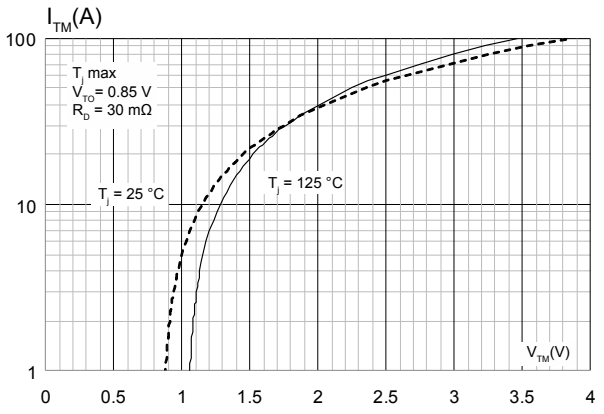


Figure 5. Surge peak on-state current versus number of cycles

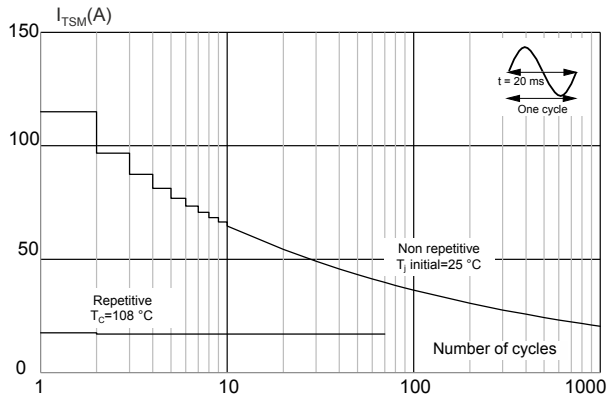


Figure 6. Non repetitive surge peak on-state current for a sinusoidal pulse with width t_p < 10 ms

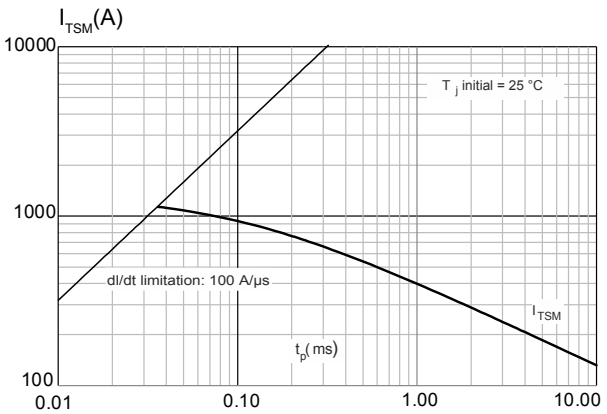


Figure 7. Relative variation of gate trigger current and voltage versus junction temperature (typical values)

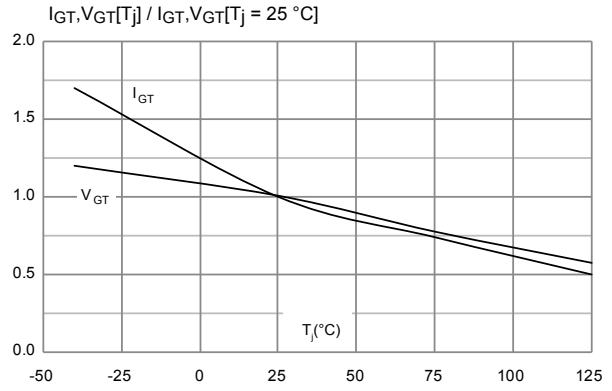


Figure 8. Relative variation of holding current and latching current versus junction temperature (typical values)

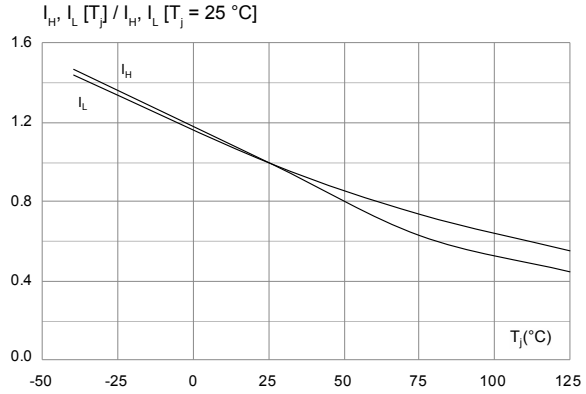


Figure 9. Relative variation of critical rate of decrease of main current versus junction temperature

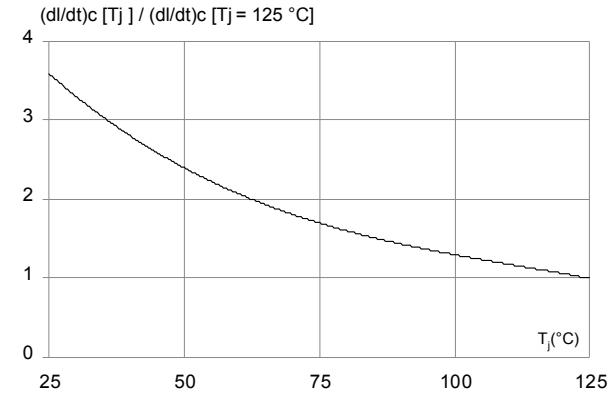


Figure 10. Relative variation of critical rate of decrease of main current (di/dt)c versus reapplied (dV/dt)c (typical values)

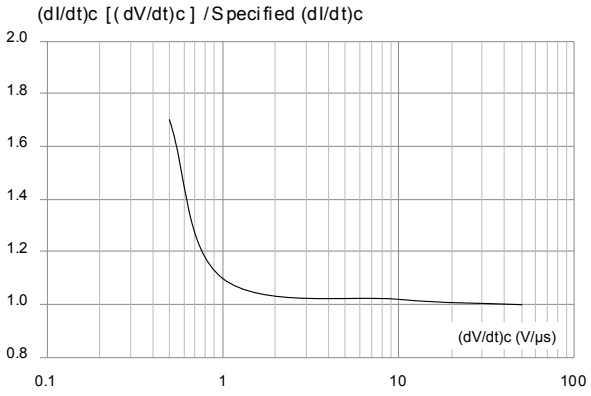


Figure 11. Relative variation of static dV/dt immunity versus junction temperature (typical values)

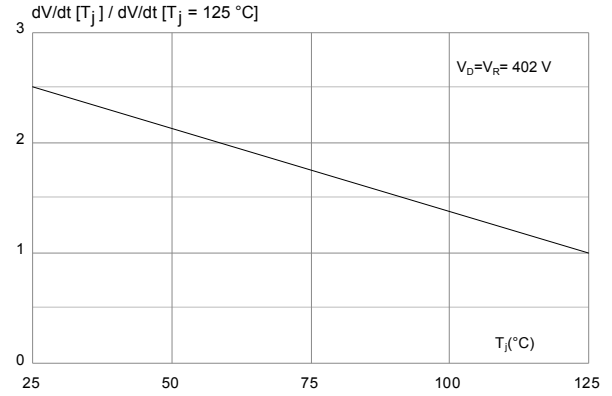


Figure 12. Relative variation of leakage current versus junction temperature

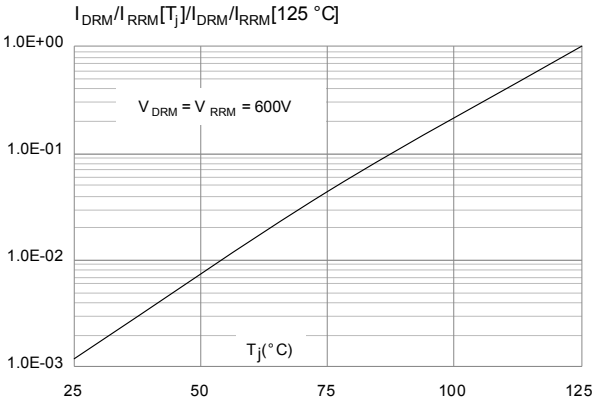


Figure 13. DPAK thermal resistance junction to ambient versus copper surface under tab

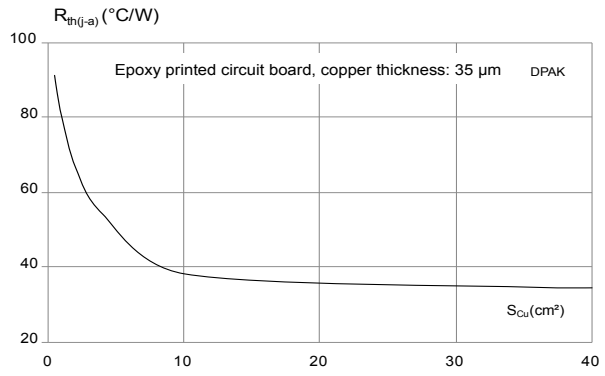
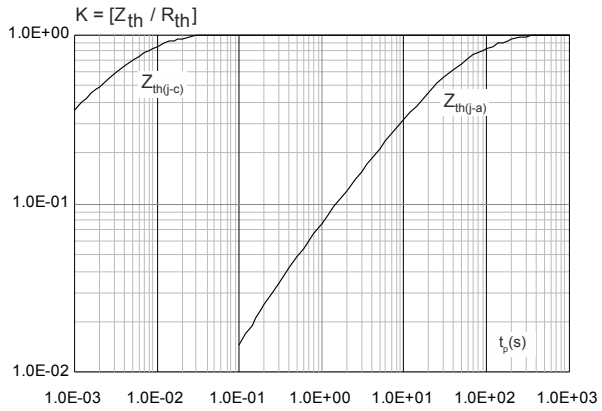


Figure 14. Relative variation of thermal impedance versus pulse duration



2 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK packages, depending on their level of environmental compliance. ECOPACK specifications, grade definitions and product status are available at: www.st.com. ECOPACK is an ST trademark.

2.1 DPAK package information

- Molding compouned resin is halogen free and meets UL94 flammability standard, level V0
- Lead-free package

Figure 15. DPAK package outline

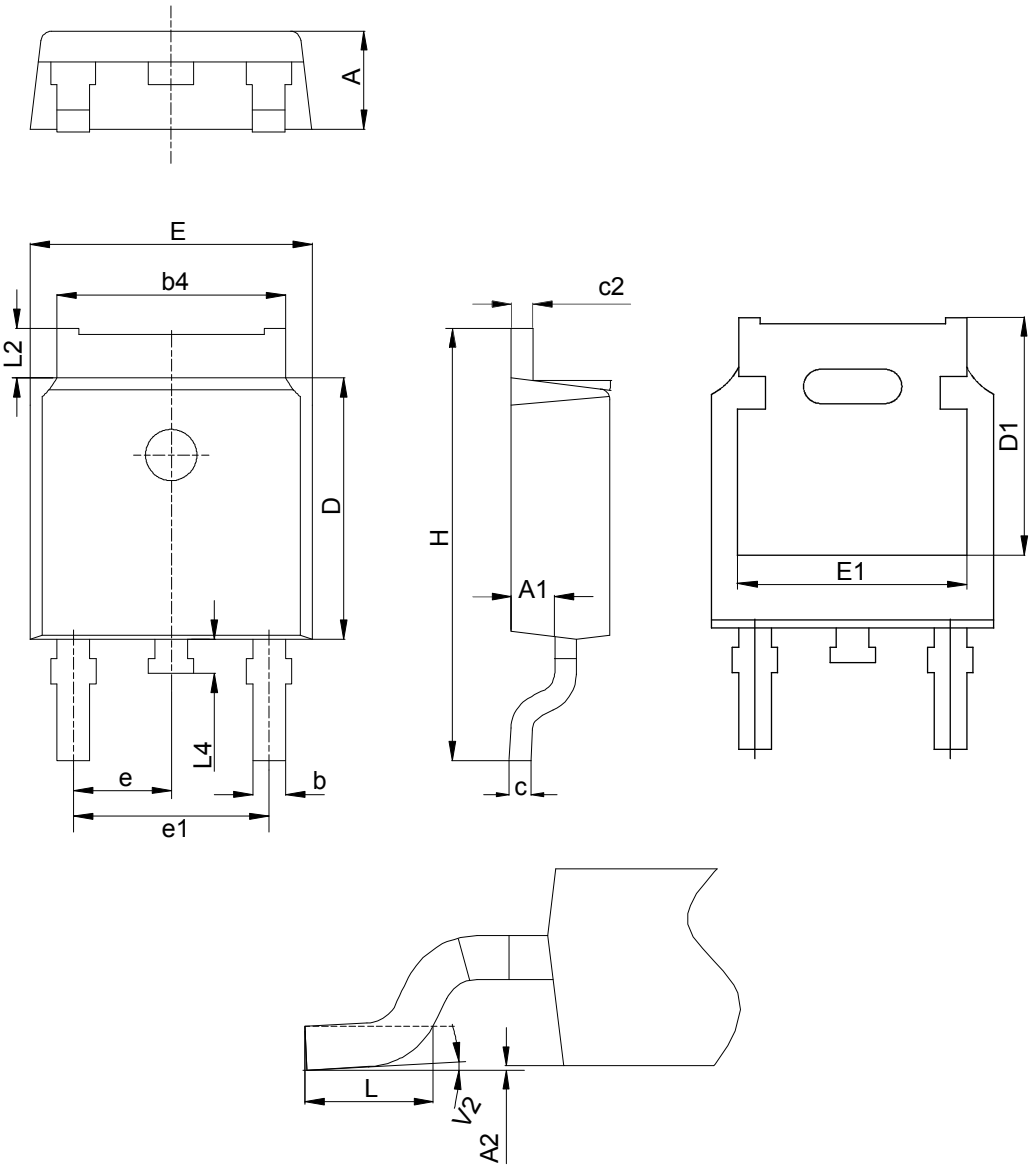


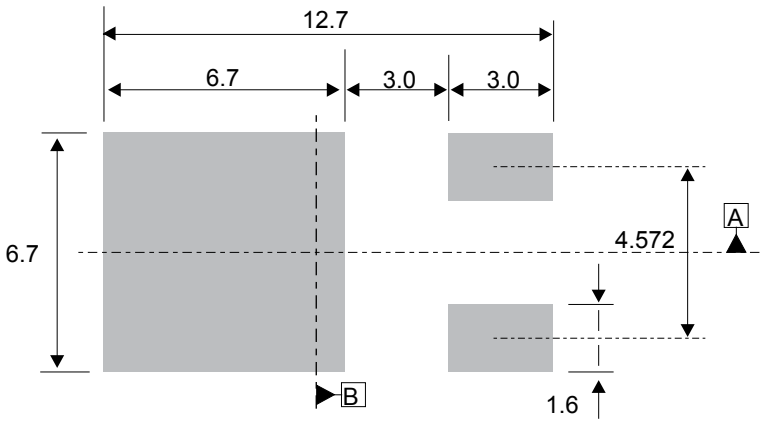
Table 5. DPAK package mechanical data

Ref.	Dimensions					
	Millimeters			Inches[1]		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.18		2.40	0.0858		0.0945
A1	0.90		1.10	0.0354		0.0433
A2	0.03		0.23	0.0012		0.0091
b	0.64		0.90	0.0252		0.354
b4	4.95		5.46	0.1949		0.2150
c	0.46		0.61	0.0181		0.0240
c2	0.46		0.60	0.0181		0.0236
D	5.97		6.22	0.2350		0.2449
D1	4.95		5.60	0.1949		0.2205
E	6.35		6.73	0.2500		0.2650
E1	4.32		5.50	0.1701		0.2165
e		2.286			0.0900	
e1	4.40		4.70	0.1732		0.1850
H	9.35		10.40	0.3681		0.4094
L	1.00		1.78	0.0394		0.0701
L2			1.27			0.0500
L4	0.60		1.02	0.0236		0.0402
V2[2]	-8°		+8°	-8°		+8°

1. *Dimensions in inches are given for reference only*
2. *Degree*

Note: This package drawing may slightly differ from the physical package. However, all the specified dimensions are guaranteed.

Figure 16. DPAK recommended footprint (dimensions are in mm)



3 Ordering information

Figure 17. **Ordering information scheme**

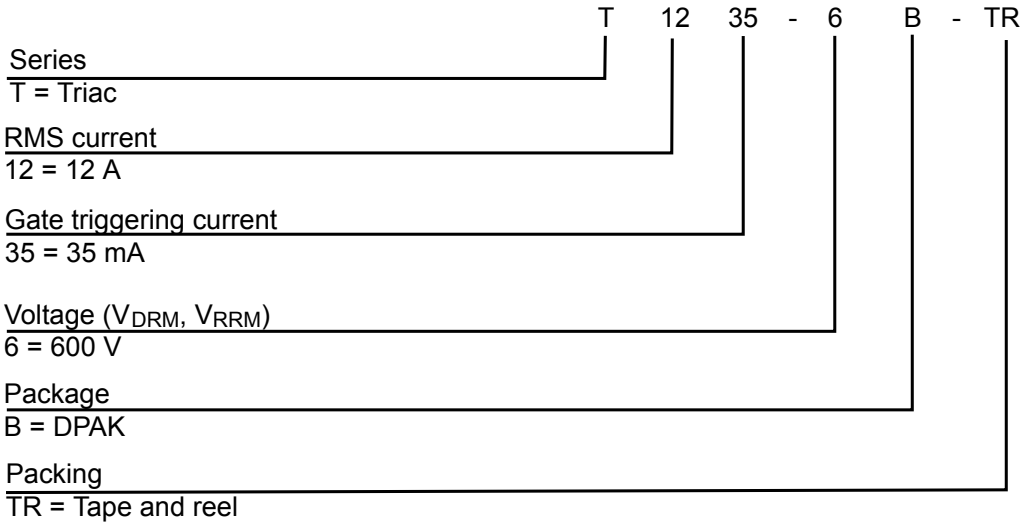


Table 6. **Ordering information**

Order code	Marking	Package	Weight	Base qty.	Delivery mode
T1235-6B-TR	T12 3560	DPAK	0.35 g	2500	Tape and reel 13''

Revision history

Table 7. **Document revision history**

Date	Revision	Changes
18-Dec-2019	1	Initial release.
17-Sep-2020	2	Improved I_{TSM} value on Table 1, Figure 5 and Figure 6.

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