NCR100Q-6M

SCR

Rev.01 - 28 June 2019

Product data sheet

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) with sensitive gate in a SOT89 surface mountable plastic package. This SCR is designed to be interfaced directly to microcontrollers, logic integrated circuits and other low power gate trigger circuits.

2. Features and benefits

- Sensitive gate
- High voltage capability
- Planar passivated for voltage ruggedness and reliability
- Surface mountable package

3. Applications

- Ground Fault Circuit Interrupters (GFCI)
- General purpose switching and phase control
- Ignition circuits, CDI for 2- and 3-wheelers
- Motor control-e.g. small kitchen appliances

4. Quick reference data

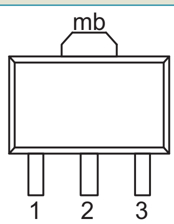
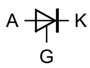
Table 1. Quick reference data

Symbol	Parameter	Conditions	Values	Unit
Absolute maximum rating				
V_{RRM}	repetitive peak reverse voltage		600	V
$I_{T(RMS)}$	RMS on-state current	half sine wave; $T_{sp} \leq 109$ °C; Fig. 1; Fig. 2; Fig. 3	0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)} = 25$ °C; $t_p = 10$ ms; Fig. 4; Fig. 5	8	A
		half sine wave; $T_{j(init)} = 25$ °C; $t_p = 8.3$ ms	9	A
T_j	junction temperature		125	°C

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7		15	-	100	µA
I_H	holding current	V_D = 12 V; T_j = 25 °C; $R_{GK(ext)}$ = 1 kΩ; Fig. 9		-	-	5	mA
V_T	on-state voltage	I_T = 1.6 A; T_j = 25 °C; Fig. 10		-	1.4	1.7	V
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 600 V; T_j = 125 °C; R_{GK}= 1 kΩ; exponential waveform		100	-	-	V/µs

5. Pinning information

Table 2. Pinning information

Pin	Symbol	Description	Simplified outline	Graphic symbol
1	G	gate		 sym037
2	A	anode		
3	K	cathode		
mb	mb	mounting base; connected to anode		

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
NCR100Q-6M	SOT89	NCR100Q-6MJ	Reel	1000	SOT89L	8-Mar-2019

7. Marking

Table 4. Marking codes

Type number	Marking codes
NCR100Q-6M	NCR1006M

8. Limiting values

Table 5. Limiting values

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

Symbol	Parameter	Conditions	Values	Unit
V_{DRM}	repetitive peak off-state voltage		600	V
V_{RRM}	repetitive peak reverse voltage		600	V
$I_{T(AV)}$	average on-state current	half sine wave; T_{sp} ≤ 109 °C	0.51	A
$I_{T(RMS)}$	RMS on-state current	half sine wave; T_{sp} ≤ 109 °C; Fig. 1; Fig. 2; Fig. 3	0.8	A
I_{TSM}	non-repetitive peak on-state current	half sine wave; $T_{j(init)}$ = 25 °C; t_p = 10 ms; Fig. 4; Fig. 5	8	A
		half sine wave; $T_{j(init)}$ = 25 °C; t_p = 8.3 ms	9	A
I^2t	I^2t for fusing	t_p = 10ms; sine wave	0.32	A^2s
dI_T/dt	rate of rise of on-state current	I_G = 0.2 mA	50	A/µs
I_{GM}	peak gate current		1	A
V_{GM}	peak gate voltage		5	V
P_{GM}	peak gate power		2	W
$P_{G(AV)}$	average gate power	over any 20 ms period	0.1	W
T_{stg}	storage temperature		-40 to 150	°C
T_j	junction temperature		125	°C

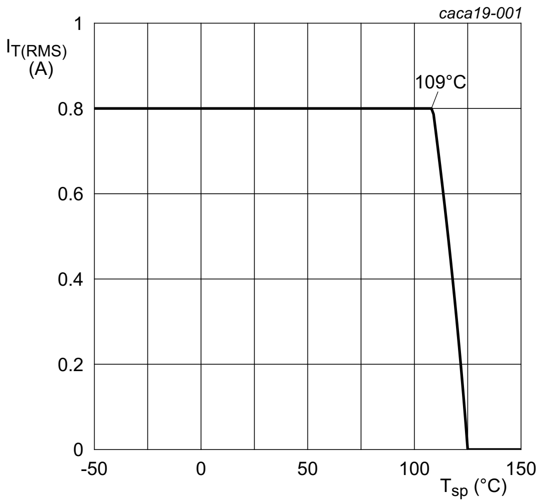
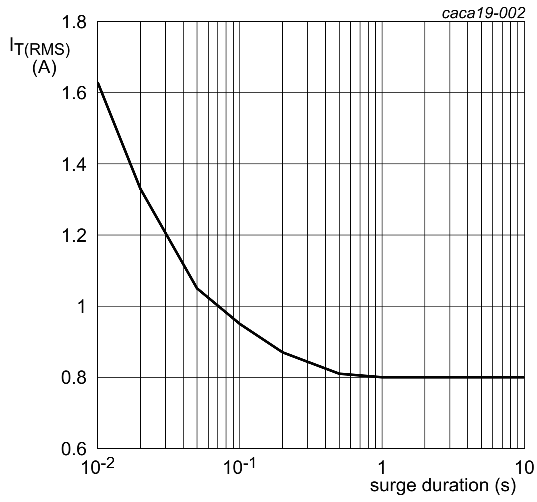
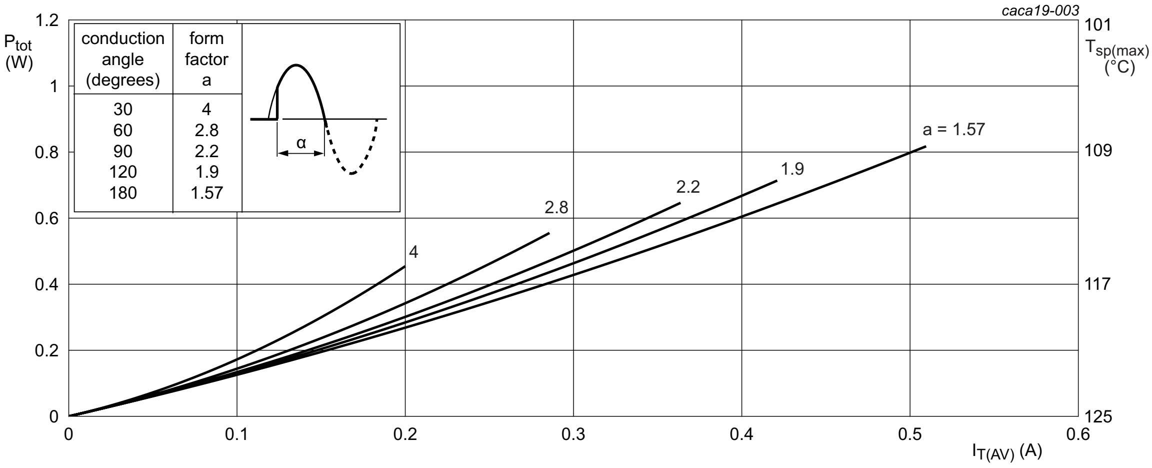


Fig. 1. RMS on-state current as a function of solder point temperature; maximum values



f = 50Hz; T_{sp} = 109 °C

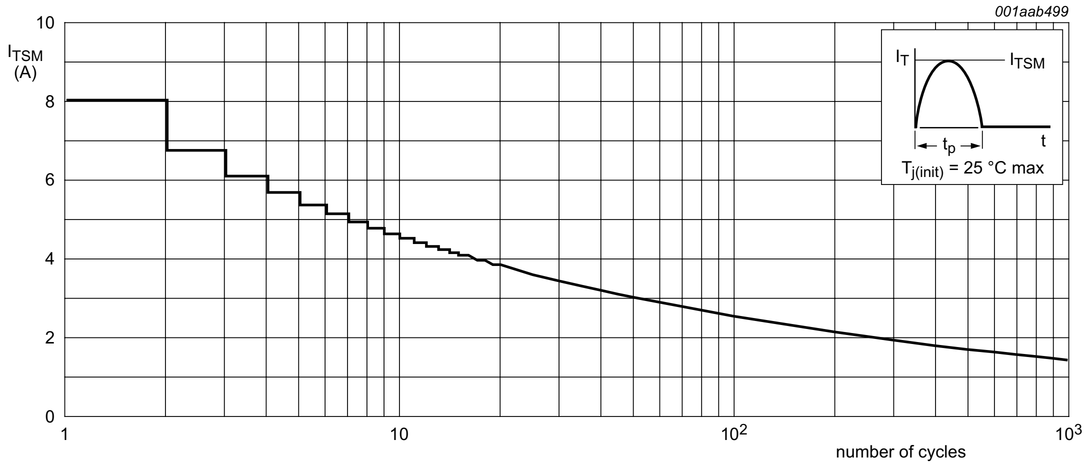
Fig. 2. RMS on-state current as a function of surge duration; maximum values



α = conduction angle

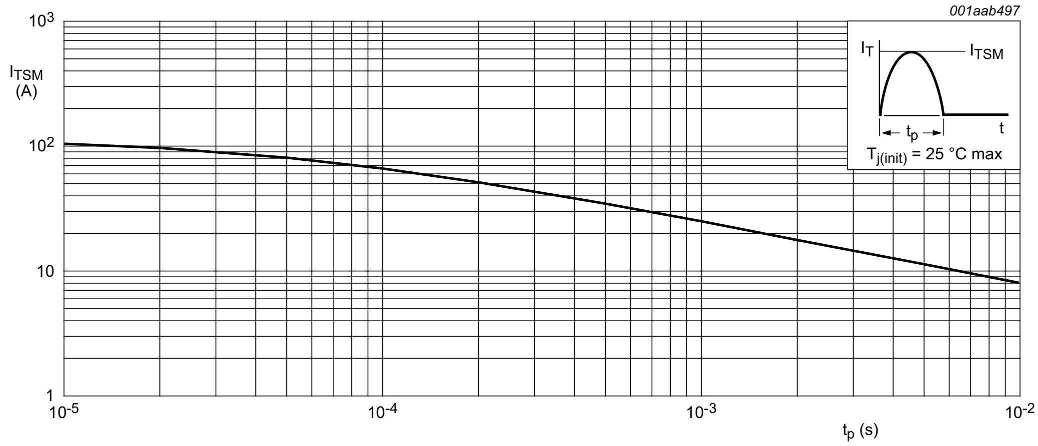
a = form factor = $I_{T(RMS)}$ / $I_{T(AV)}$

Fig. 3. Total power dissipation as a function of RMS on-state current; maximum values



f = 50 Hz

Fig. 4. Non-repetitive peak on-state current as a function of the number of sinusoidal current cycles; maximum values



$t_p \leq 10$ ms

Fig. 5. Non-repetitive peak on-state current as a function of pulse duration; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions		Min	Typ	Max	Unit
$R_{th(j-sp)}$	thermal resistance from junction to solder point	Fig. 6		-	-	20	K/W
$R_{th(j-a)}$	thermal resistance from junction to ambient free air	in free air		-	90	-	K/W

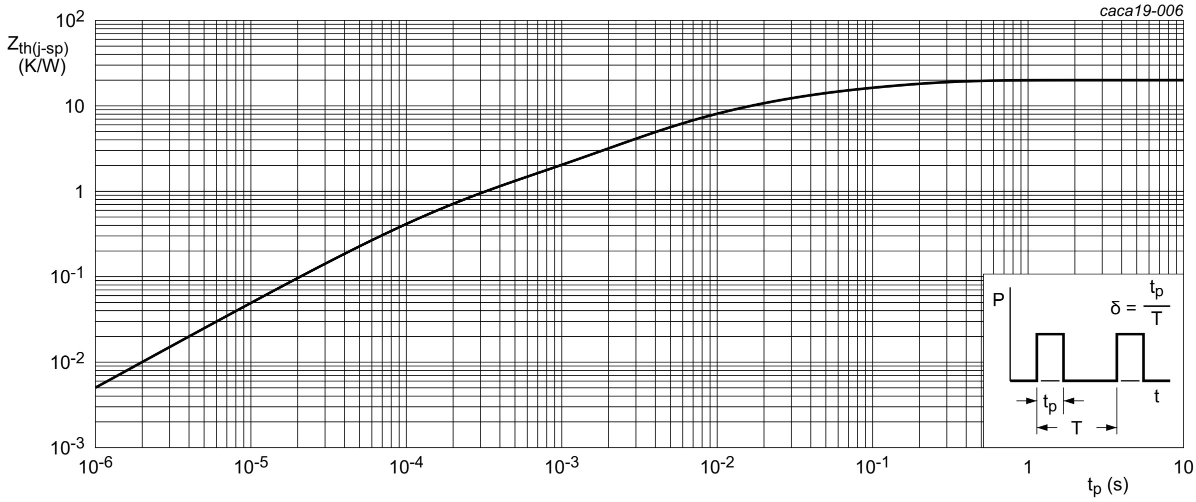


Fig. 6. Transient thermal impedance from junction to solder point as a function of pulse duration

10. Characteristics

Table 7. Characteristics

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Static characteristics						
I_{GT}	gate trigger current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 7	15	-	100	µA
I_L	latching current	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; $R_{GK(ext)}$ = 1 kΩ; Fig. 8	-	-	6	mA
I_H	holding current	V_D = 12 V; T_j = 25 °C; $R_{GK(ext)}$ = 1 kΩ; Fig. 9	-	-	5	mA
V_T	on-state voltage	I_T = 1.6 A; T_j = 25 °C; Fig. 10	-	1.4	1.7	V
V_{GT}	gate trigger voltage	V_D = 12 V; I_T = 0.1 A; T_j = 25 °C; Fig. 11	-	0.7	1	V
		V_D = 600 V; I_T = 0.1 A; T_j = 125 °C	0.2	0.5	-	V
I_D	off-state current	V_D = 600 V; T_j = 125 °C	-	-	0.1	mA
I_R	reverse current	V_D = 600 V; T_j = 125 °C	-	-	0.1	mA
Dynamic characteristics						
dV_D/dt	rate of rise of off-state voltage	V_{DM} = 600 V; T_j = 125 °C; R_{GK}= 1 kΩ; exponential waveform	100	-	-	V/µs
t_{gt}	gate-controlled turn-on time	I_{TM} = 2 A; V_D = 600 V; I_G = 1 mA; $(dI_G/dt)_M$ = 0.1 A/µs; T_j = 25 °C	-	2	-	µs
t_q	commutated turn-off time	V_{DM} = 402 V; T_j = 125 °C; I_{TM} = 1.6 A; V_R = 35 V; dV_D/dt = 2 V/µs; $(dI_T/dt)_M$ = 30 A/µs; $R_{GK(ext)}$ = 1 kΩ ; (V_{DM} = 67% of V_{DRM})	-	100	-	µs

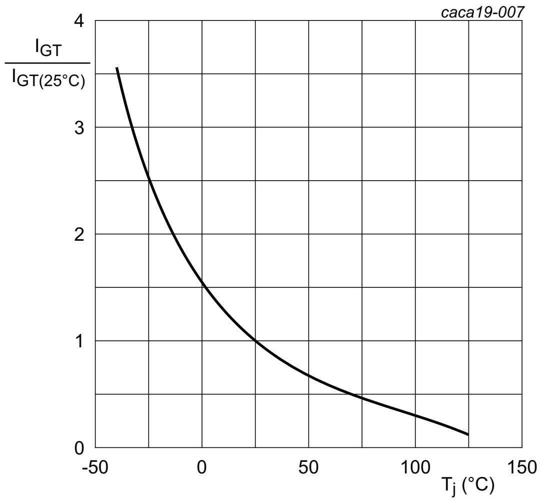


Fig. 7. Normalized gate trigger current as a function of junction temperature

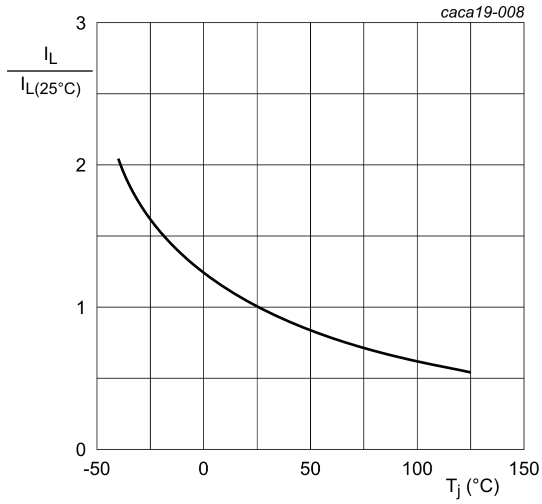


Fig. 8. Normalized latching current as a function of junction temperature

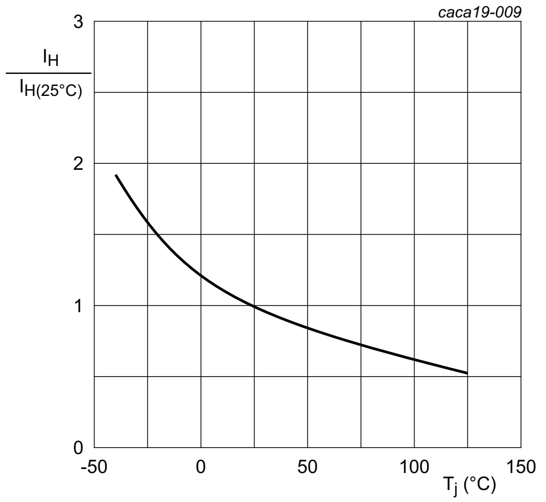
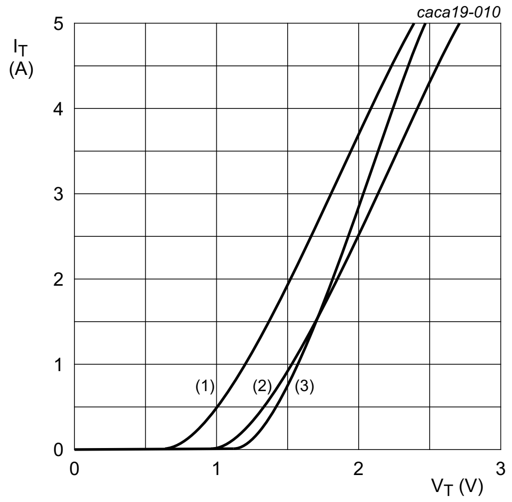


Fig. 9. Normalized holding current as a function of junction temperature



V_o = 1.173 V; R_s = 0.3437 Ω

(1) T_j = 125 °C; typical values

(2) T_j = 125 °C; maximum values

(3) T_j = 25 °C; maximum values

Fig. 10. On-state current as a function of on-state voltage

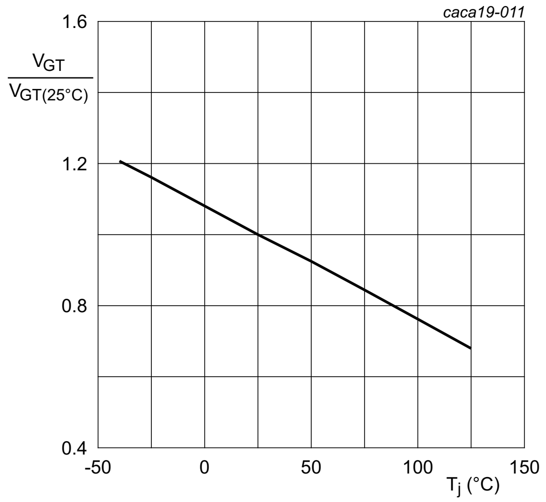
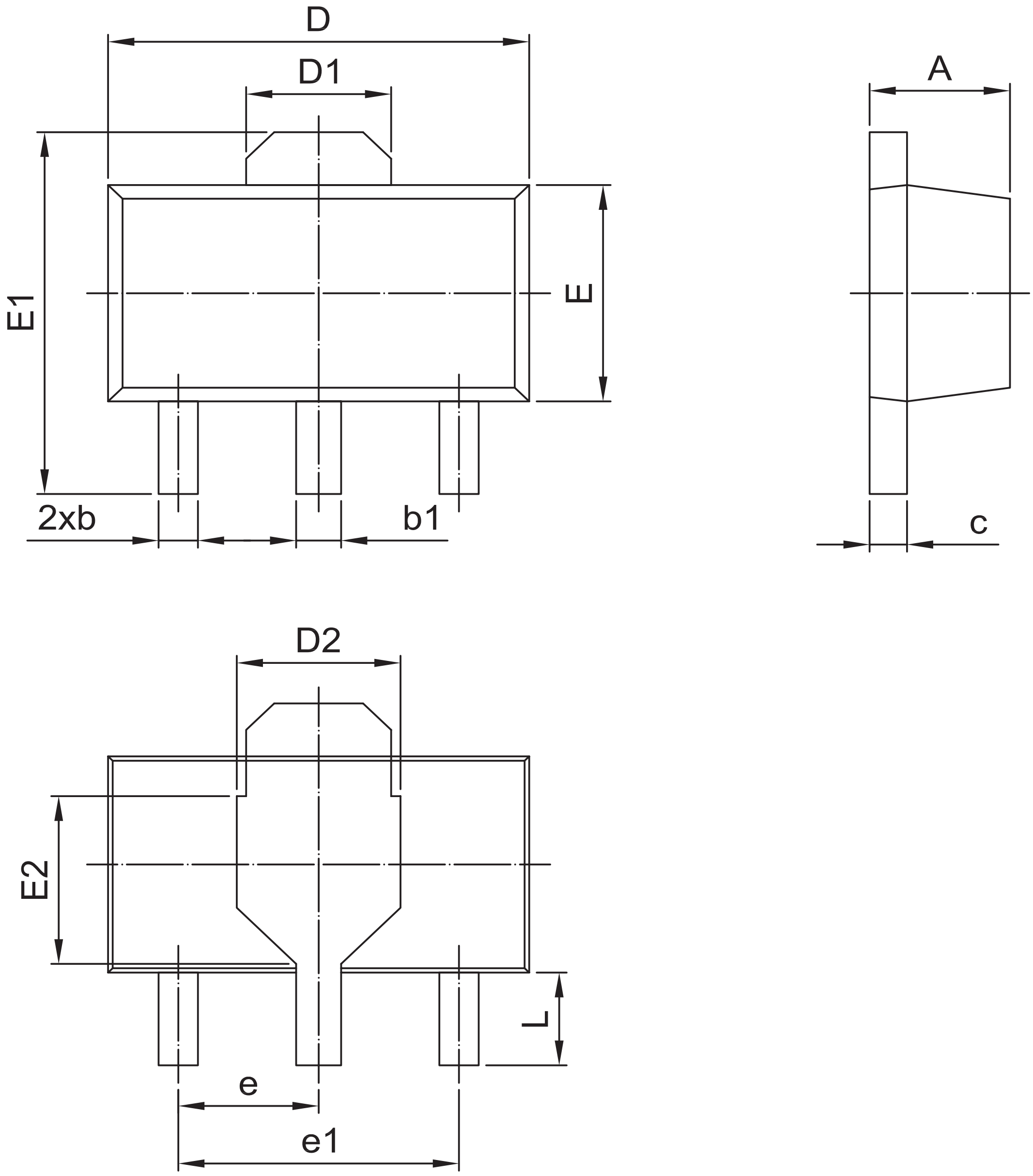


Fig. 11. Normalized gate trigger voltage as a function of junction temperature

11. Package outline

Plastic small outline package; 4 leads

SOT89



UNIT		A	b	b1	c	D	D1	D2	E	E1	E2	e	e1	L
mm	Min	1.35	0.32	0.40	0.30	4.35	(1.55)	(1.75)	2.30	3.85	(1.90)	1.50 TYP	3.00 TYP	0.85
	Max	1.65	0.52	0.60	0.50	4.65			2.60	4.35				1.25

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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.
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Date of release: 28 June 2019

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