

MOSFETs Silicon P-Channel MOS (U-MOSVI)

# SSM6J808R

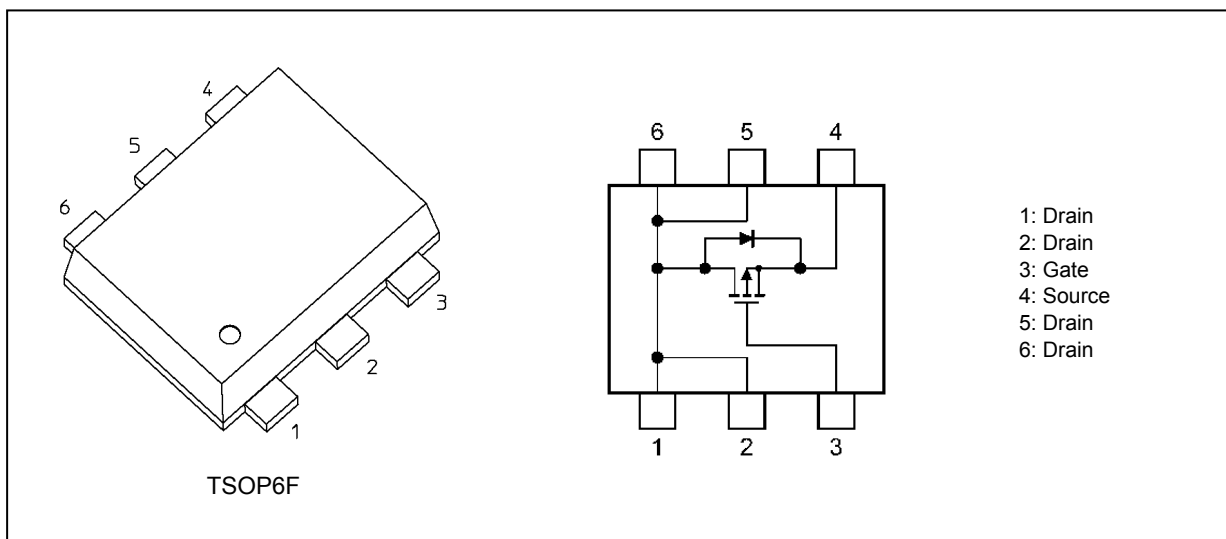
## 1. Applications

- Power Management Switches

## 2. Features

- (1) AEC-Q101 qualified (Please see the orderable part number list)
- (2) 4-V drive
- (3) Low drain-source on-resistance
  - :  $R_{DS(ON)} = 28 \text{ m}\Omega$  (typ.) ( $V_{GS} = -10 \text{ V}$ )
  - $R_{DS(ON)} = 35 \text{ m}\Omega$  (typ.) ( $V_{GS} = -4.5 \text{ V}$ )
  - $R_{DS(ON)} = 38 \text{ m}\Omega$  (typ.) ( $V_{GS} = -4 \text{ V}$ )

## 3. Packaging and Internal Circuit



## 4. Orderable part number

Orderable part number	AEC-Q101	Note
SSM6J808R,LF	—	General Use
SSM6J808R,LXGF	YES (Note 1)	Unintended Use (Note 1)
SSM6J808R,LXHF	YES	Automotive Use

Note 1: For more information, please contact our sales or use the inquiry form on our website.

Start of commercial production  
2019-09

### 5. Absolute Maximum Ratings (Note) (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	-40	V
Gate-source voltage	$V_{GSS}$	-20/+10	
Drain current (DC) (Note 1)	$I_D$	-7	A
Drain current (pulsed) (Note 1), (Note 2)	$I_{DP}$	-35	
Power dissipation (Note 3)	$P_D$	1.5	W
Power dissipation (t < 10 s) (Note 3)		3	
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to 150	
Single-pulse avalanche energy (Note 4)	$E_{AS}$	40	mJ
Single-pulse avalanche current	$I_{AS}$	-6.3	A

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Ensure that the channel temperature does not exceed  $150\text{ }^\circ\text{C}$ .

Note 2: Pulse width (PW)  $\leq 10\text{ }\mu\text{s}$ , duty  $\leq 1\%$

Note 3: Device mounted on a  $25.4\text{ mm} \times 25.4\text{ mm} \times 1.6\text{ mm}$  FR4 glass epoxy board (Cu pad:  $645\text{ mm}^2$ )

Note 4:  $V_{DD} = -32\text{ V}$ ,  $T_{ch} = 25\text{ }^\circ\text{C}$  (Initial state),  $L = 1\text{ mH}$ ,  $R_G = 25\text{ }\Omega$

Note: The MOSFETs in this device are sensitive to electrostatic discharge. When handling this device, the worktables, operators, soldering irons and other objects should be protected against anti-static discharge.

Note: The channel-to-ambient thermal resistance,  $R_{th(ch-a)}$ , and the drain power dissipation,  $P_D$ , vary according to the board material, board area, board thickness and pad area. When using this device, be sure to take heat dissipation fully into account.

### 6. Electrical Characteristics

#### 6.1. Static Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = -20/+10\text{ V}$	—	—	$\pm 100$	nA
Drain cut-off current	$I_{DSS}$	$V_{DS} = -40\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	$\mu\text{A}$
Drain-source breakdown voltage	$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-40	—	—	V
Drain-source breakdown voltage (Note 1)	$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 10\text{ V}$	-30	—	—	
Gate threshold voltage	$V_{th}$	$V_{DS} = -10\text{ V}, I_D = -0.1\text{ mA}$	-0.8	—	-2	
Drain-source on-resistance (Note 2)	$R_{DS(ON)}$	$I_D = -2.5\text{ A}, V_{GS} = -4\text{ V}$	—	38	52	m $\Omega$
		$I_D = -2.5\text{ A}, V_{GS} = -4.5\text{ V}$	—	35	48	
		$I_D = -2.5\text{ A}, V_{GS} = -10\text{ V}$	—	28	35	

Note 1: If a reverse bias is applied between gate and source, this device enters  $V_{(BR)DSX}$  mode. Note that the drain-source breakdown voltage is lowered in this mode.

Note 2: Pulse measurement.

#### 6.2. Dynamic Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Input capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	1020	—	pF
Reverse transfer capacitance	$C_{riss}$		—	136	—	
Output capacitance	$C_{oss}$		—	169	—	
Switching time (turn-on time)	$t_{on}$	$V_{DD} = -20\text{ V}, I_D = -1\text{ A},$ $V_{GS} = 0\text{ to }-10\text{ V}, R_G = 10\text{ }\Omega$ Duty $\leq 1\%$ , Input; $t_r, t_f < 5\text{ ns}$ Ground source	—	32	—	ns
Switching time (turn-off time)	$t_{off}$		—	151	—	

#### 6.3. Switching Time Test Circuit

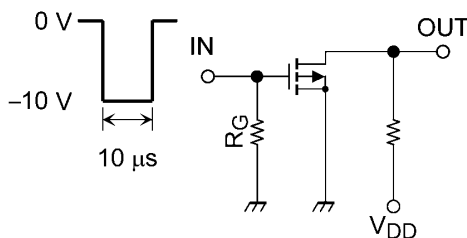


Fig. 6.3.1 Switching Time Test Circuit

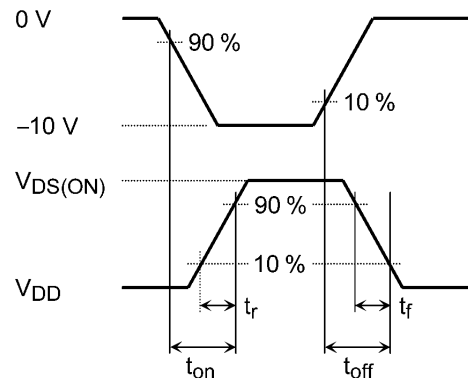


Fig. 6.3.2 Input Waveform/Output Waveform

#### 6.4. Gate Charge Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

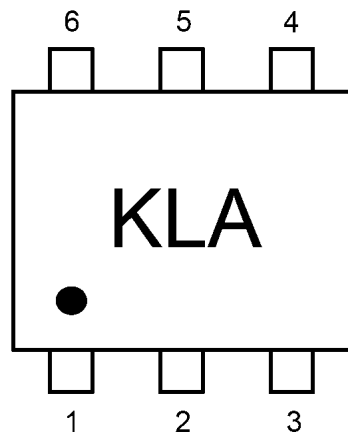
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} = -32\text{ V}, I_D = -5\text{ A},$ $V_{GS} = -10\text{ V}$	—	24.2	—	nC
Gate-source charge 1	$Q_{gs1}$		—	3	—	
Gate-drain charge	$Q_{gd}$		—	5.3	—	

#### 6.5. Source-Drain Characteristics (Unless otherwise specified, $T_a = 25\text{ }^\circ\text{C}$ )

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Diode forward voltage (Note 1)	$V_{DSF}$	$I_D = 7\text{ A}, V_{GS} = 0\text{ V}$	—	0.86	1.2	V

Note 1: Pulse measurement.

## 7. Marking



### 8. Characteristics Curves (Note)

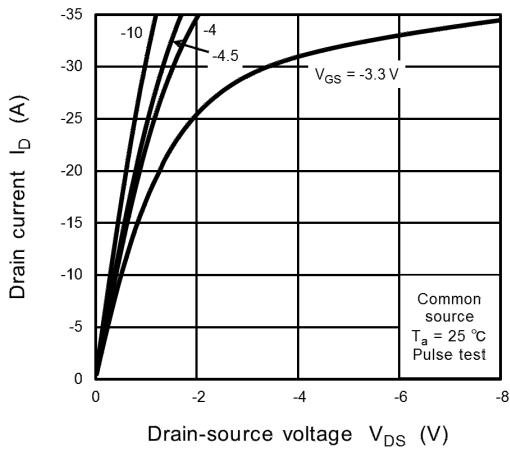


Fig. 8.1  $I_D - V_{DS}$

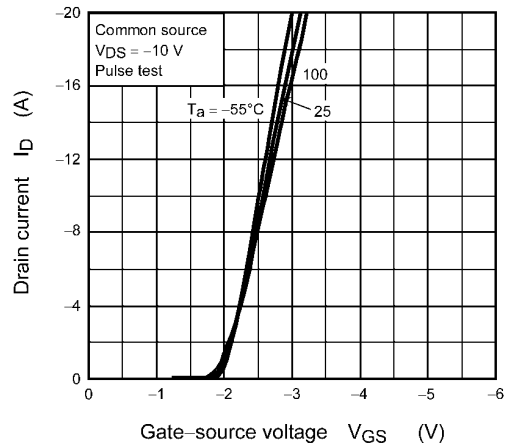


Fig. 8.2  $I_D - V_{GS}$

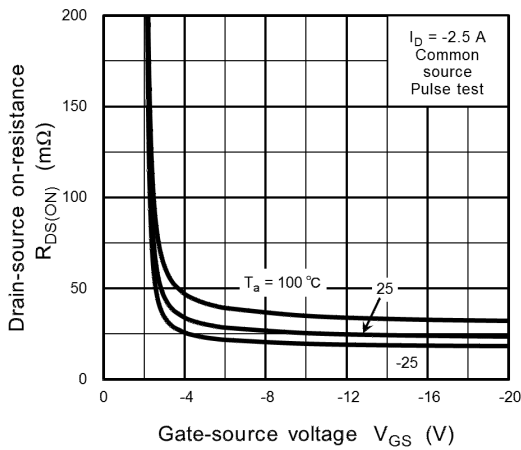


Fig. 8.3  $R_{DS(ON)} - V_{GS}$

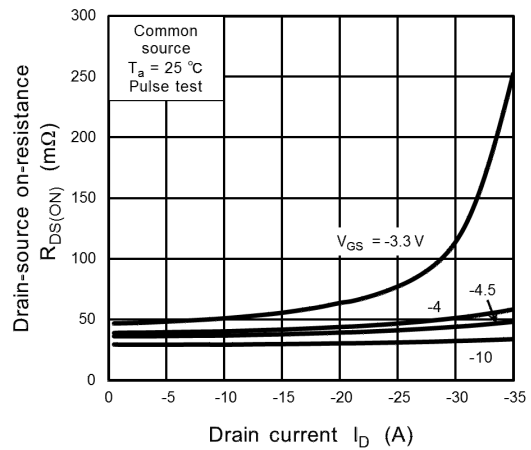


Fig. 8.4  $R_{DS(ON)} - I_D$

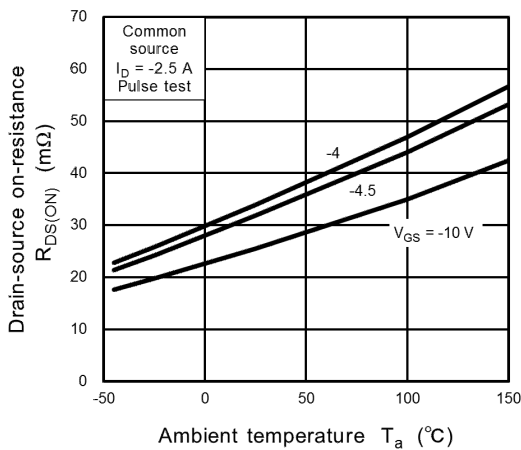


Fig. 8.5  $R_{DS(ON)} - T_a$

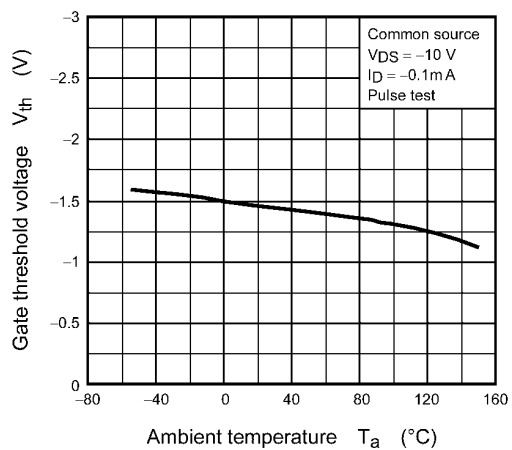
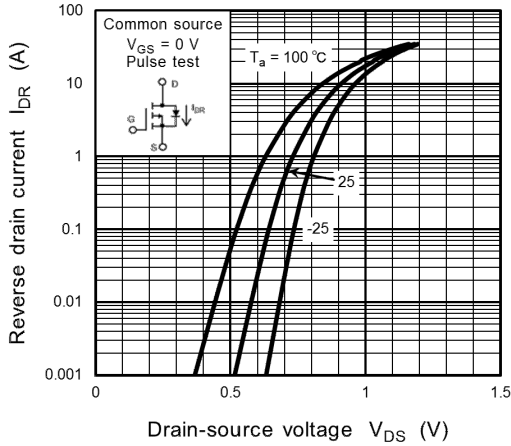
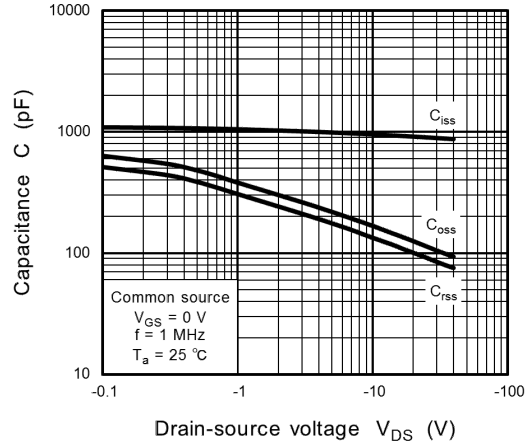


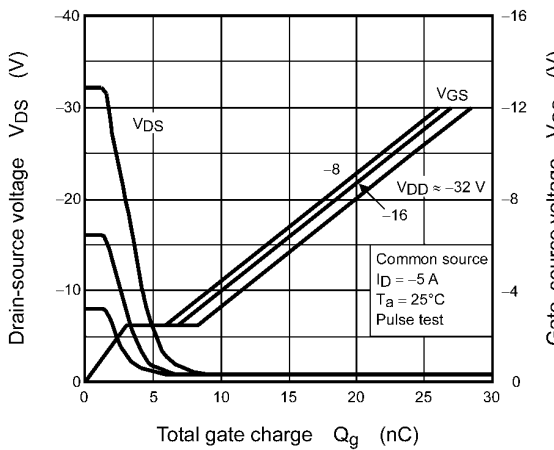
Fig. 8.6  $V_{th} - T_a$



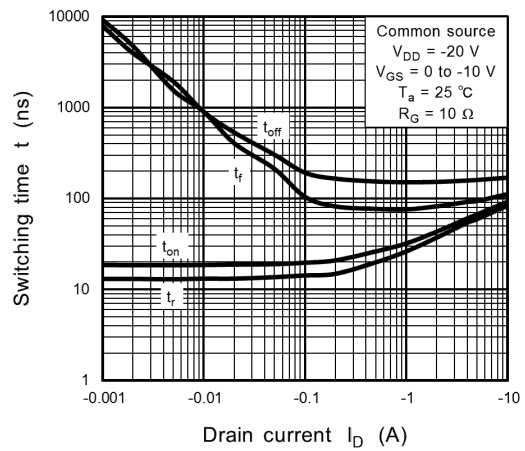
**Fig. 8.7  $I_{DR} - V_{DS}$**



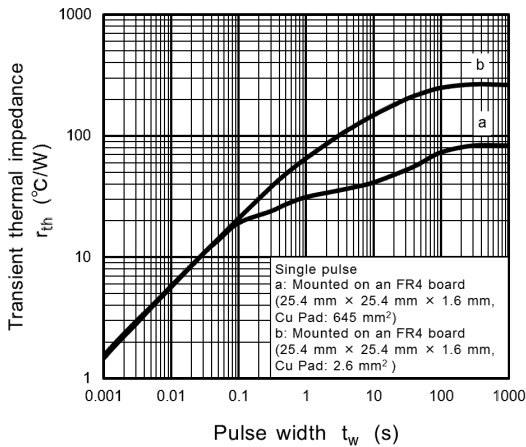
**Fig. 8.8  $C - V_{DS}$**



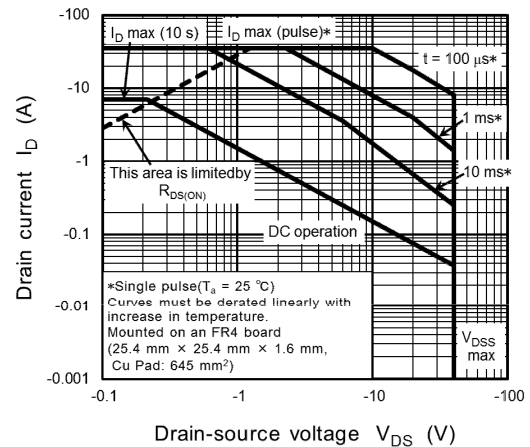
**Fig. 8.9 Dynamic Input Characteristics**



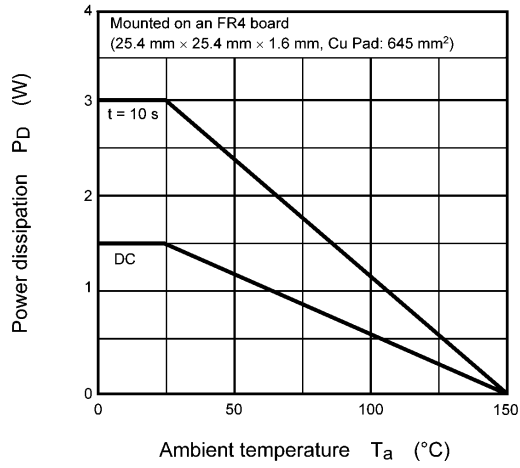
**Fig. 8.10  $t - I_D$**



**Fig. 8.11  $r_{th} - t_w$**



**Fig. 8.12 Safe Operating Area**

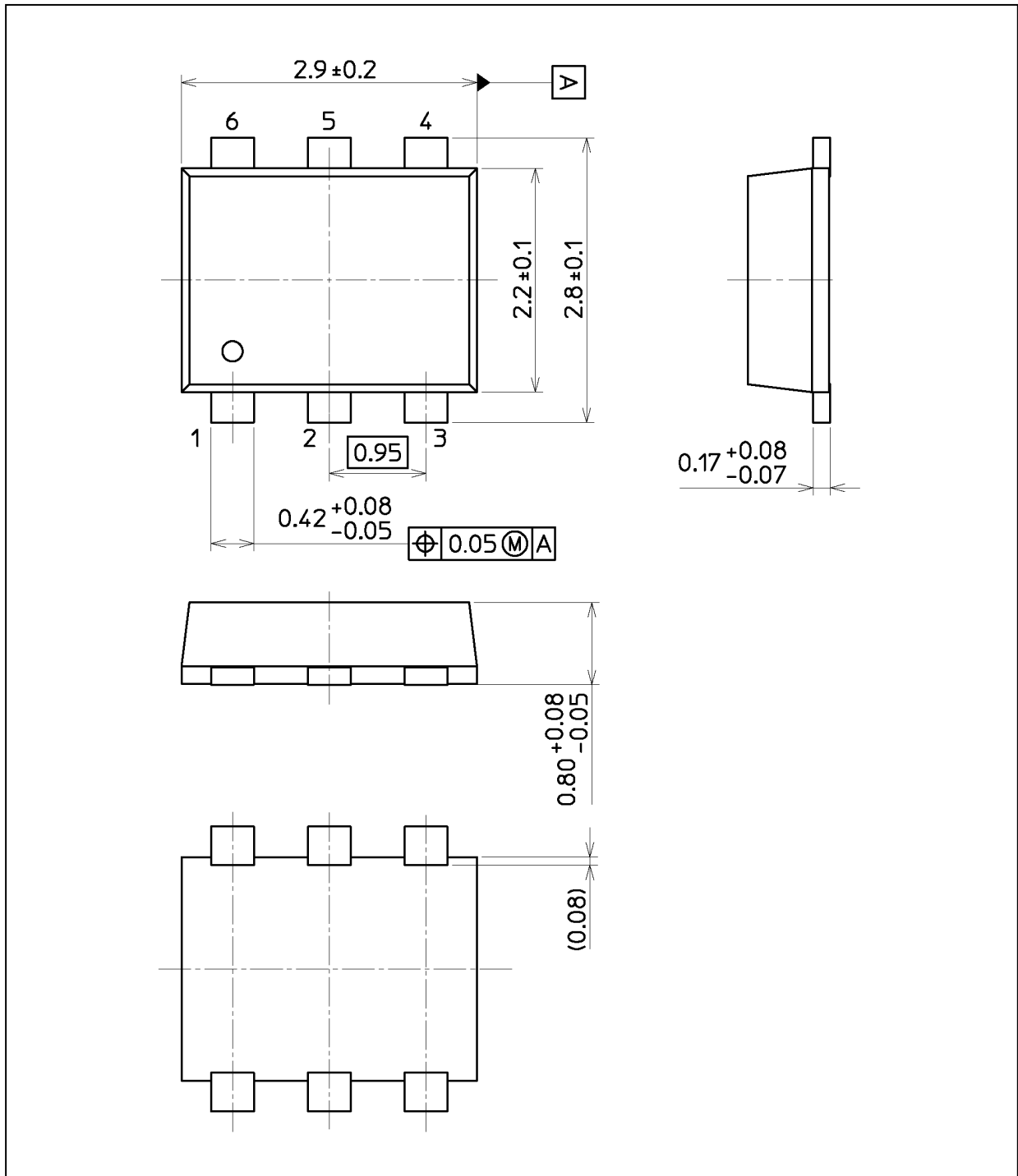


**Fig. 8.13** P<sub>D</sub> - T<sub>a</sub>

Note: The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

## Package Dimensions

Unit: mm



Weight: 0.016 g (typ.)

Package Name(s)
Nickname: TSOP6F



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