

TOSHIBA

TC74LCX573F/FW/FT

TOSHIBA CMOS DIGITAL INTEGRATED CIRCUIT SILICON MONOLITHIC

TC74LCX573F, TC74LCX573FW, TC74LCX573FT

LOW VOLTAGE OCTAL D-TYPE LATCH WITH 5V TOLERANT INPUTS AND OUTPUTS

The TC74LCX573 is a high performance CMOS OCTAL D-TYPE LATCH. Designed for use in 3.3 Volt systems, it achieves high speed operation while maintaining the CMOS low power dissipation.

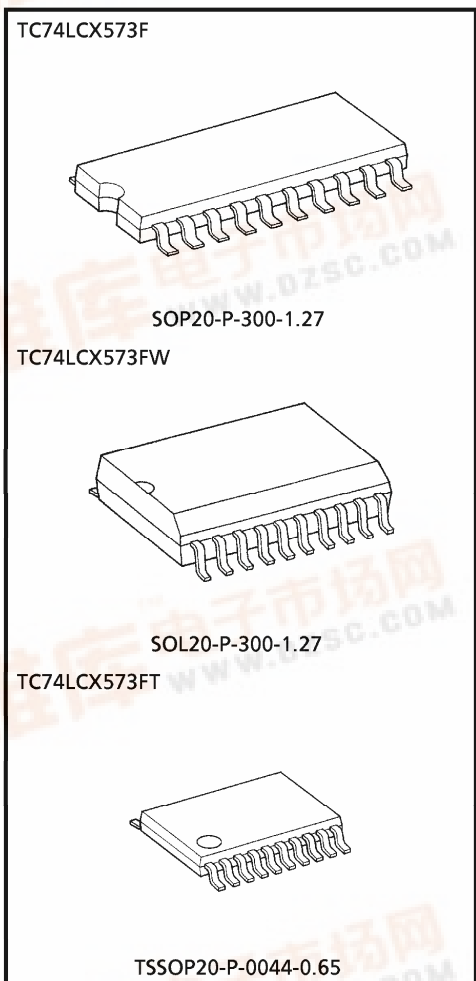
The device is designed for low-voltage (3.3V) V_{CC} applications, but it could be used to interface to 5V supply environment for both inputs and outputs.

This 8bit D-type latch is controlled by a latch enable input (LE) and an output enable input (\overline{OE}).

When the \overline{OE} input is high, the eight outputs are in a high impedance state.

All inputs are equipped with protection circuits against static discharge.

(Note) The JEDEC SOP (FW) is not available in Japan.



FEATURES

- Low voltage operation : $V_{CC} = 2.0 \sim 3.6V$
- High speed operation : $t_{pd} = 8.0ns$ (Max.)
($V_{CC} = 3.0 \sim 3.6V$)
- Output current : $|I_{OH}| / I_{OL} = 24mA$ (Min.)
($V_{CC} = 3.0V$)
- Latch-up performance : $\pm 500mA$
- Available in JEDEC SOP, EIAJ SOP and TSSOP
- Power down protection is provided on all inputs and outputs.
- Pin and function compatible with the 74 series (74AC/VHC/HC/F/ALS/LS etc.) 573 type.

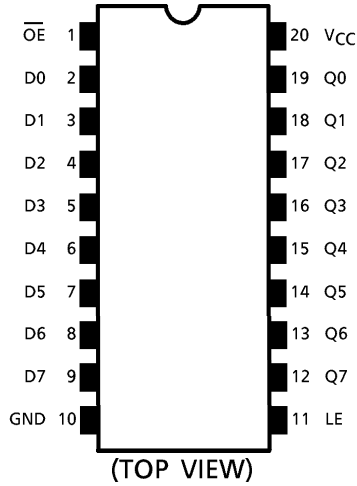
Weight

- SOP20-P-300-1.27 : 0.22g (Typ.)
- SOL20-P-300-1.27 : 0.46g (Typ.)
- TSSOP20-P-0044-0.65 : 0.08g (Typ.)

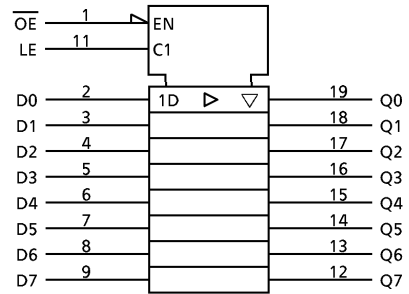
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PIN ASSIGNMENT



IEC LOGIC SYMBOL

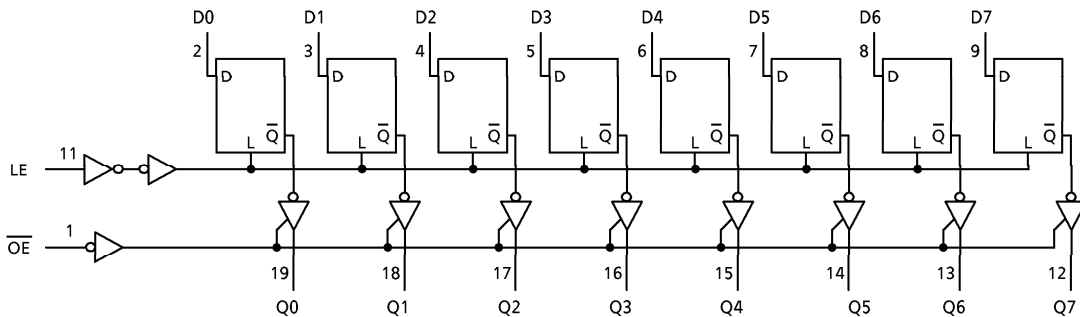


TRUTH TABLE

INPUTS			OUTPUTS
\overline{OE}	LE	D	
H	X	X	Z
L	L	X	Qn
L	H	L	L
L	H	H	H

- X : Don't Care
- Z : High Impedance
- Qn: Q outputs are latched at the time when the LE input is taken to a low logic level.

SYSTEM DIAGRAM



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MAXIMUM RATINGS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage Range	V_{CC}	-0.5~7.0	V
DC Input Voltage	V_{IN}	-0.5~7.0	V
DC Output Voltage	V_{OUT}	-0.5~7.0 (Note 1)	V
		-0.5~ V_{CC} +0.5 (Note 2)	
Input Diode Current	I_{IK}	-50	mA
Output Diode Current	I_{OK}	±50 (Note 3)	mA
DC Output Current	I_{OUT}	±50	mA
Power Dissipation	P_D	180	mW
DC V_{CC} /Ground Current	I_{CC}/I_{GND}	±100	mA
Storage Temperature	T_{stg}	-65~150	°C

(Note 1) Output in Off-State

(Note 2) High or Low State. I_{OUT} absolute maximum rating must be observed.

(Note 3) $V_{OUT} < GND$, $V_{OUT} > V_{CC}$

RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V_{CC}	2.0~3.6	V
		1.5~3.6 (Note 4)	
Input Voltage	V_{IN}	0~5.5	V
Output Voltage	V_{OUT}	0~5.5 (Note 5)	V
		0~ V_{CC} (Note 6)	
Output Current	I_{OH}/I_{OL}	±24 (Note 7)	mA
		±12 (Note 8)	
Operating Temperature	T_{opr}	-40~85	°C
Input Rise And Fall Time	dt/dv	0~10 (Note 9)	ns/V

(Note 4) Data Retention Only

(Note 5) Output in Off-State

(Note 6) High or Low State

(Note 7) $V_{CC} = 3.0\sim 3.6V$

(Note 8) $V_{CC} = 2.7\sim 3.0V$

(Note 9) $V_{IN} = 0.8\sim 2.0V$, $V_{CC} = 3.0V$

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS ($T_a = -40 \sim 85^\circ\text{C}$)

PARAMETER		SYMBOL	TEST CONDITION	V_{CC} (V)	MIN.	MAX.	UNIT	
Input Voltage	"H" Level	V_{IH}		2.7~3.6	2.0	—	V	
	"L" Level	V_{IL}		2.7~3.6	—	0.8		
Output Voltage	"H" Level	V_{OH}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OH} = -100\mu\text{A}$	2.7~3.6	$V_{CC} - 0.2$	—	V
				$I_{OH} = -12\text{mA}$	2.7	2.2	—	
				$I_{OH} = -18\text{mA}$	3.0	2.4	—	
				$I_{OH} = -24\text{mA}$	3.0	2.2	—	
	"L" Level	V_{OL}	$V_{IN} = V_{IH}$ or V_{IL}	$I_{OL} = 100\mu\text{A}$	2.7~3.6	—	0.2	
				$I_{OL} = 12\text{mA}$	2.7	—	0.4	
				$I_{OL} = 16\text{mA}$	3.0	—	0.4	
				$I_{OL} = 24\text{mA}$	3.0	—	0.55	
Input Leakage Current		I_{IN}	$V_{IN} = 0 \sim 5.5\text{V}$	2.7~3.6	—	± 5.0	μA	
3-State Output Off-State Current		I_{OZ}	$V_{IN} = V_{IH}$ or V_{IL} $V_{OUT} = 0 \sim 5.5\text{V}$	2.7~3.6	—	± 5.0	μA	
Power Off Leakage Current		I_{OFF}	$V_{IN} / V_{OUT} = 5.5\text{V}$	0	—	10.0	μA	
Quiescent Supply Current		I_{CC}	$V_{IN} = V_{CC}$ or GND	2.7~3.6	—	10.0	μA	
			$V_{IN} / V_{OUT} = 3.6 \sim 5.5\text{V}$	2.7~3.6	—	± 10.0		
Increase In I_{CC} Per Input		ΔI_{CC}	$V_{IH} = V_{CC} - 0.6\text{V}$	2.7~3.6	—	500	μA	

AC CHARACTERISTICS (Ta = -40~85°C)

PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	MIN.	MAX.	UNIT
Propagation Delay Time (D-Q)	t _{pLH}	(Fig.1, 2)	2.7	—	9.0	ns
	t _{pHL}		3.3 ± 0.3	1.5	8.0	
Propagation Delay Time (LE-Q)	t _{pLH}	(Fig.1, 2)	2.7	—	9.5	ns
	t _{pHL}		3.3 ± 0.3	1.5	8.5	
Output Enable Time	t _{pZL}	(Fig.1, 3)	2.7	—	9.5	ns
	t _{pZH}		3.3 ± 0.3	1.5	8.5	
Output Disable Time	t _{pLZ}	(Fig.1, 3)	2.7	—	7.0	ns
	t _{pHZ}		3.3 ± 0.3	1.5	6.5	
Minimum Pulse Width (LE)	t _w (H)	(Fig.1, 2)	2.7	3.3	—	ns
			3.3 ± 0.3	3.3	—	
Minimum Set-Up Time	t _s	(Fig.1, 2)	2.7	2.5	—	ns
			3.3 ± 0.3	2.5	—	
Minimum Hold Time	t _h	(Fig.1, 2)	2.7	1.5	—	ns
			3.3 ± 0.3	1.5	—	
Output To Output Skew	t _{osLH} t _{osHL}	(Note 10)	2.7	—	—	ns
			3.3 ± 0.3	—	1.0	

(Note 10) Parameter guaranteed by design.
 (t_{osLH} = |t_{pLHm} - t_{pLHn}|, t_{osHL} = |t_{pHLm} - t_{pHLn}|)

DYNAMIC SWITCHING CHARACTERISTICS (Ta = 25°C, Input t_r = t_f = 2.5ns, C_L = 50pF, R_L = 500Ω)

PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	TYP.	UNIT
Quiet Output Maximum Dynamic V _{OL}	V _{OLP}	V _{IH} = 3.3V, V _{IL} = 0V	3.3	0.8	V
Quiet Output Minimum Dynamic V _{OL}	V _{OLV}	V _{IH} = 3.3V, V _{IL} = 0V	3.3	0.8	V

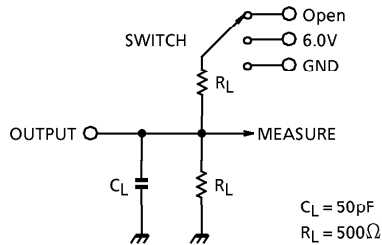
CAPACITIVE CHARACTERISTICS (Ta = 25°C)

PARAMETER	SYMBOL	TEST CONDITION	V _{CC} (V)	TYP.	UNIT
Input Capacitance	C _{IN}	—	3.3	7	pF
Output Capacitance	C _{OUT}		3.3	8	pF
Power Dissipation Capacitance	C _{PD}	f _{IN} = 10MHz (Note 11)	3.3	25	pF

(Note 11) C_{PD} is defined as the value of the internal equivalent capacitance which is calculated from the operating current consumption.
 Average operating current can be obtained by the equation :
 I_{CC (opr.)} = C_{PD} · V_{CC} · f_{IN} + I_{CC} / 8 (per bit)

TEST CIRCUIT

Fig.1



PRAMETER	SWITCH
t_{pLH}, t_{pHL}	Open
t_{pLZ}, t_{pZL}	6.0V
t_{pHZ}, t_{pZH}	GND
t_w, t_s, t_h	Open

AC WAVEFORM

Fig.2 $t_{pLH}, t_{pHL}, t_w, t_s, t_h$

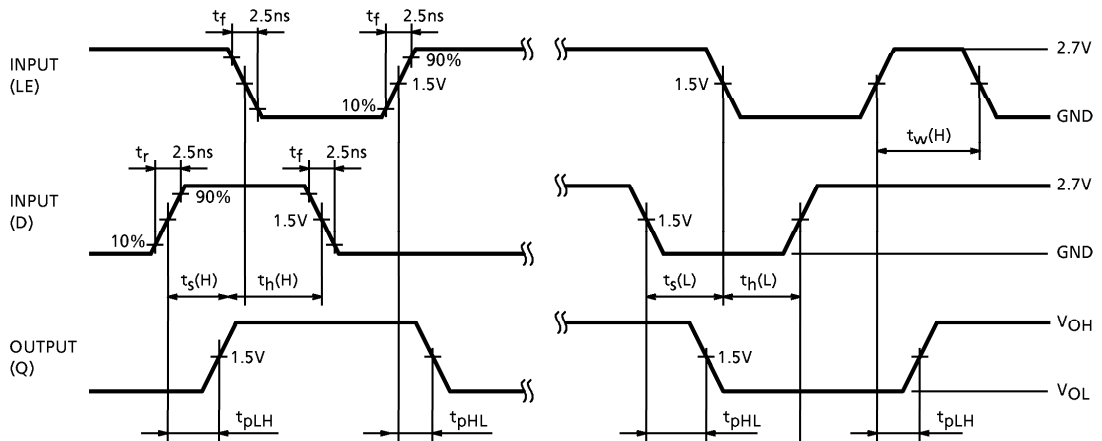
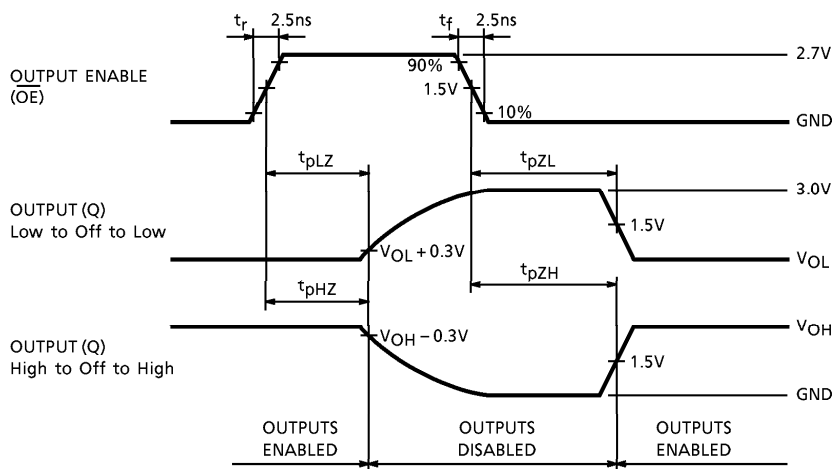
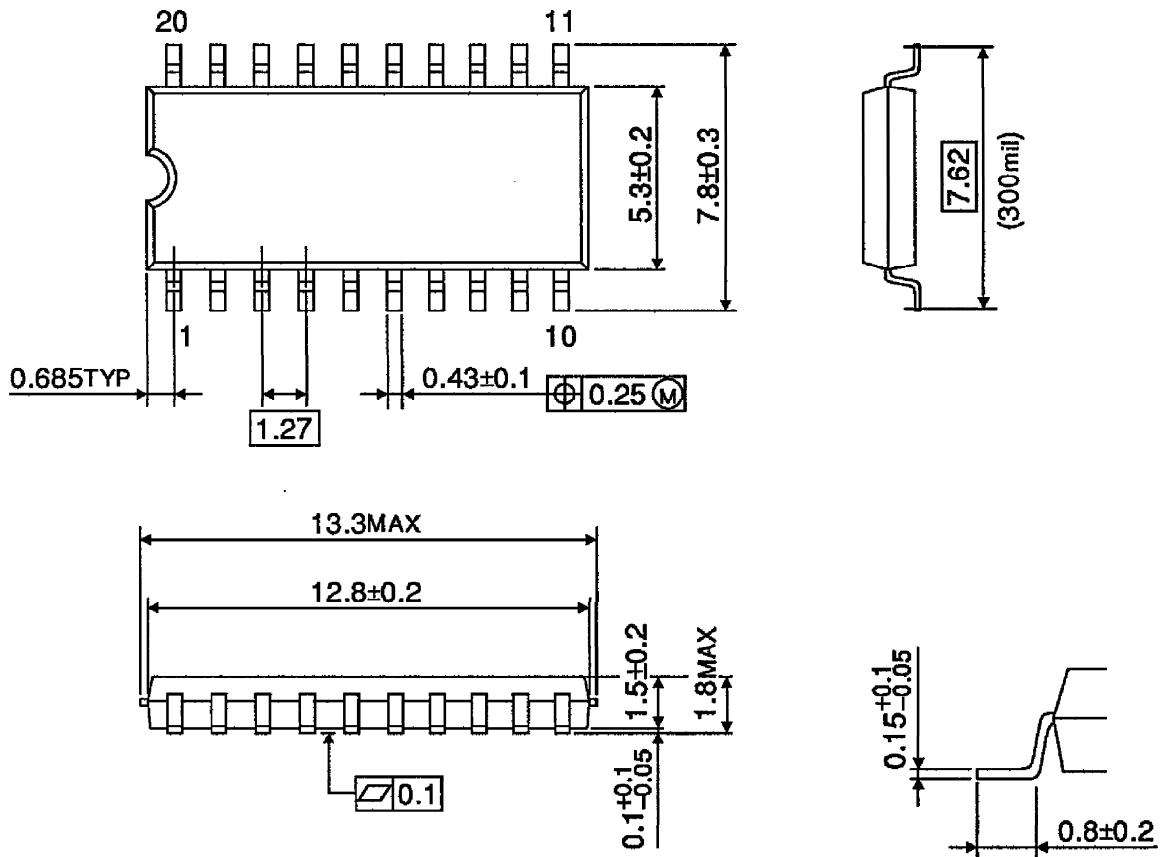


Fig.3 $t_{pLZ}, t_{pHZ}, t_{pZL}, t_{pZH}$



OUTLINE DRAWING
SOP20-P-300-1.27

Unit : mm

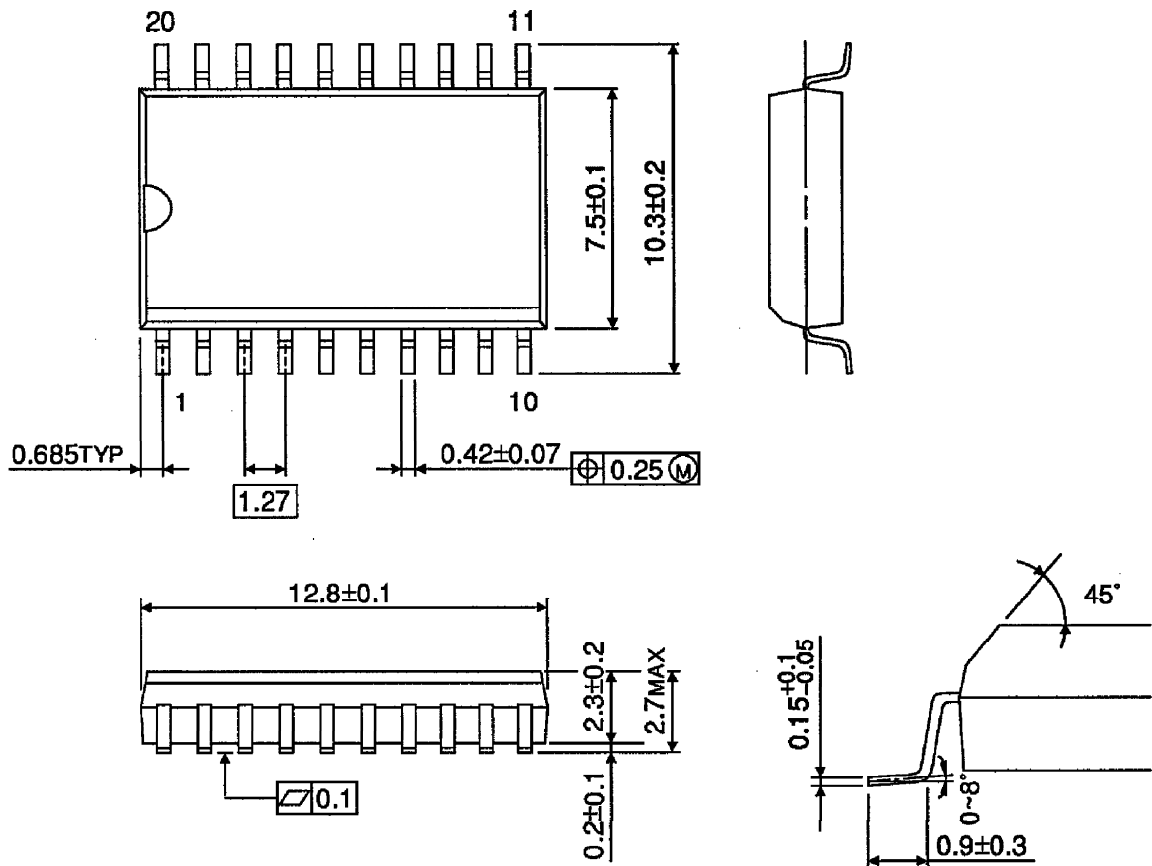


Weight : 0.22g (Typ.)

OUTLINE DRAWING
SOL20-P-300-1.27

Unit : mm

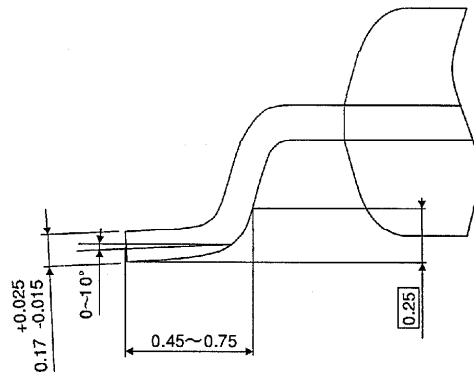
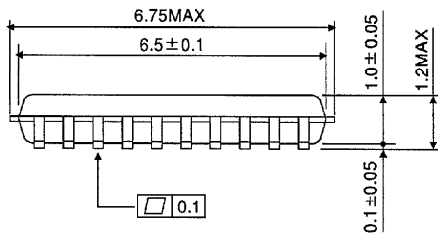
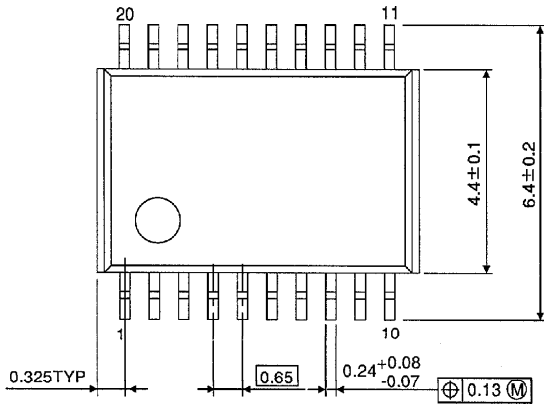
(Note) This package is not available in Japan.



Weight : 0.46g (Typ.)

OUTLINE DRAWING
TSSOP20-P-0044-0.65

Unit : mm



Weight : 0.08g (Typ.)