

OTC-029

7 COLOR LED BLINKING IC

DATE: DEC. 5, 2001
PRELIMINARY

■ FEATURES

- CMOS technology
- 3-channel PMOS output drivers
- 25mA maximum driving capability per output channel
- Retriggerable blinking control or power-down option
- Four operating modes :
 - (Mode 0) 7-color revolving with 2Hz frequency;
 - (Mode 1) 7-color fade-in/fade-out with 8sec cycle time;
 - (Mode 2) 7-color blinking with 1Hz frequency;
 - (Mode 3) 7-color retriggerable blinking with 1Hz frequency
(after 28 times blinking, all the three output channels hold "ON" state until another trigger signal turns them off)

■ GENERAL DESCRIPTIONS

The OTC-029 is a monolithic, 3-channel PMOS driver device designed for LED display applications. The device provides 7 colors blinking output, each color is composed of 3-channel outputs swapping with ON or OFF state alternatively. Color mapping table is shown below:

	CHANNEL 1	CHANNEL 2	CHANNEL 3
COLOR 1	ON	OFF	OFF
COLOR 2	OFF	ON	OFF
COLOR 3	ON	ON	OFF
COLOR 4	OFF	OFF	ON
COLOR 5	ON	OFF	ON
COLOR 6	OFF	ON	ON
COLOR 7	ON	ON	ON



OPTO TECH CORPORATION

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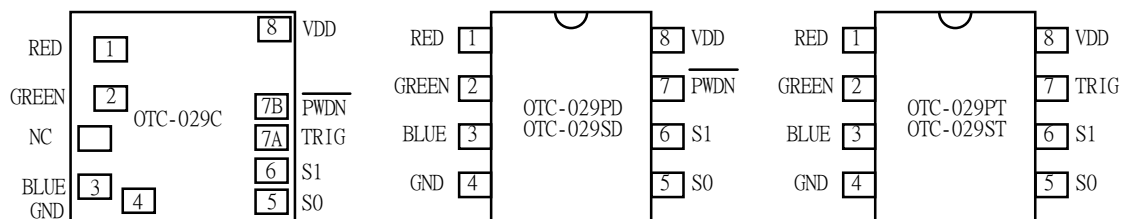
ORDERING INFORMATION

PART NO.	PACKAGE	NOTE
OTC-029C	-	Chip Form
OTC-029PD	8-PIN SSOP	PIN7 = $\overline{\text{PWN}}$
OTC-029SD	8-PIN SOP	PIN7 = $\overline{\text{PWN}}$
OTC-029PT	8-PIN SSOP	PIN7 = TRIG
OTC-029ST	8-PIN SOP	PIN7 = TRIG

ABSOLUTE MAXIMUM RATINGS

Ta=25°C , UNLESS OTHERWISE SPECIFIED			
CHARACTERISTICS	SYMBOL	RATING	UNIT
SUPPLY VOLTAGE	VDD	12V	V
LOGIC INPUT VOLTAGE	VIN	-0.3~VDD+0.3	V
POWER DISSIPATION, EACH CHANNEL	PDISSP	50	mW
OUTPUT SOURCE CURRENT, EACH CHANNEL	Iout	25	mA
OPERATING TEMPERATURE	Topr	+0~+85	°C
STORAGE TEMPERATURE	Tstr	-50~+150	°C

PIN(PAD) ASSIGNMENT (TOP VIEW)



chip size:1560u×1680u

PS:substrate should be connected to vdd or open

PIN(PAD) DESCRIPTIONS

NO	NAME	TYPE	DESCRIPTION
1	RED	OUTPUT	Red LED driver (open-drain PMOS driver)
2	GREEN	OUTPUT	Green LED driver (open-drain PMOS driver)
3	BLUE	OUTPUT	Blue LED driver (open-drain PMOS driver)
4	GND	GND	Ground
5	S0	INPUT	Low bit of MODE selection
6	S1	INPUT	High bit of MODE selection
7	TRIG/ $\overline{\text{PWN}}$	INPUT	blinking retrigger or LOW enable power down
8	VDD	POWER	Supply voltage

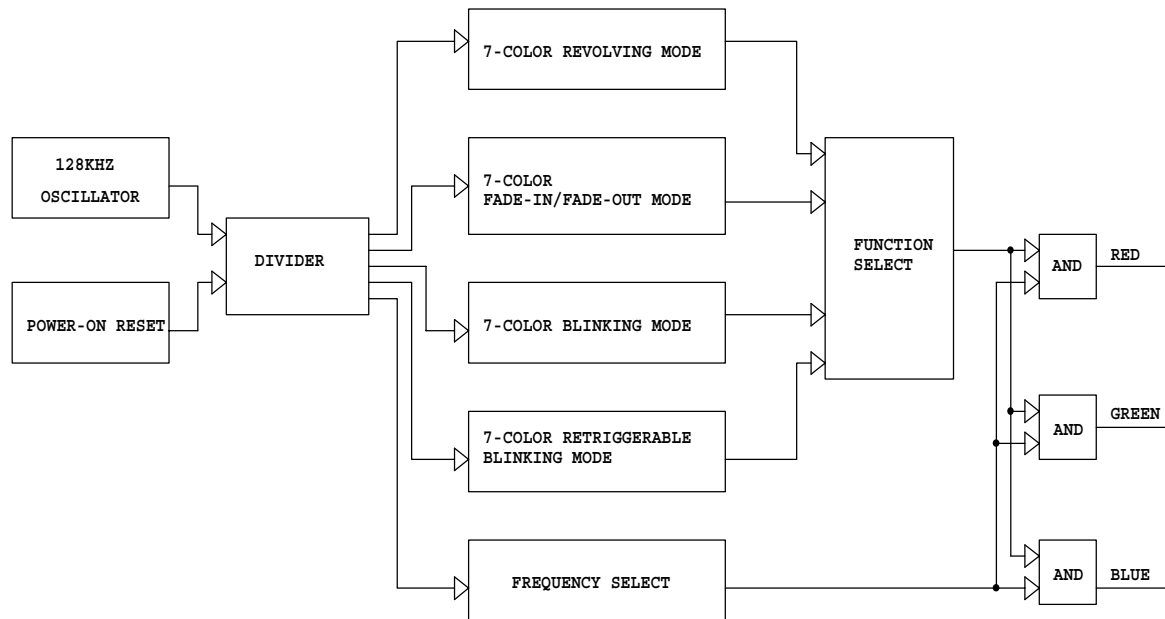


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■ FUNCTION BLOCK DIAGRAM



■ FUNCTION DESCRIPTIONS

In the OTC-029, there are four modes — 7-color revolving mode, 7-color fade-in/fade-out mode, 7-color blinking mode and 7-color retriggerable blinking mode, which are decided by the selection signals — S1 and S0.

(Mode 0) 7-color revolving mode

This mode is set with (S1,S0)=(0,0). Each color is continuously revolving with 2Hz frequency and 7 colors a cycle in turn. The revolving sequence keeps on going unless power off or $\overline{\text{PWDN}}=\text{LOW}$.

(Mode 1) 7-color fade-in/fade-out mode

When the mode selection — S1 is LOW, S0 is HIGH, mode 1 is selected. In the fade-in phase, the brightness goes from dark to light with 8 levels and each level stays with 0.5 second. In the fade-out phase, the brightness goes from light to dark reversely and each level also stays with 0.5 second. The full fade-in/fade-out period is 8 seconds. 7 colors a cycle in turn and this sequence keeps on going unless power off or $\overline{\text{PWDN}}=\text{LOW}$.



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(Mode 2) 7-color blinking mode

When the mode selection is S1 HIGH and S0 LOW, 7-color blinking mode is selected. In this mode, the output color blinks with 1Hz frequency and 7 colors a cycle in turn. The blinking sequence keeps on going unless power off or $\overline{\text{PWDN}}=\text{LOW}$.

(Mode 3) 7-color retriggerable blinking mode

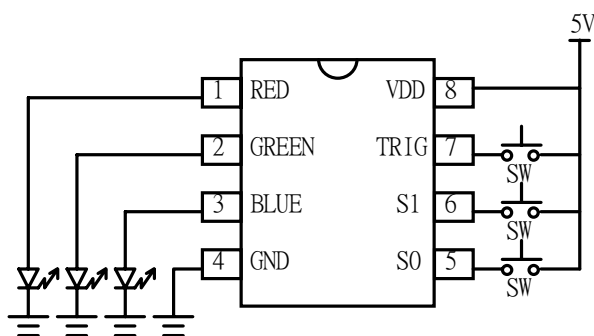
When the mode selection—S1, S0 are both HIGH, mode 3 is selected. This mode makes 7 colors blink in turn repeatedly for 28 times and then all three output channels hold ON state until another trigger signal turns them off. The blinking sequence can be triggered to re-start. A rising edge signal at the TRIG pin resets the sequence and to power on the device again is of the same action as well. To turn off the three channels, user should send another TRIG signal or turn off the power VDD.

Especially, there is a TRIG/ $\overline{\text{PWDN}}$ pin option. If $\overline{\text{PWDN}}$ is chosen, this device enters the power saving status when $\overline{\text{PWDN}}=\text{LOW}$. However, if TRIG is chosen, it can be used as the retrigger input when MODE=3.

■ APPLICATIONS

- LED backlight source
- Message indicator
- Decoration light, Christmas light
- LED embedded gift
- Toy

■ TYPICAL APPLICATION CIRCUIT



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RECOMMENDED OPERATING CONDITIONS

VDD=+5V, Ta=25°C, UNLESS OTHERWISE SPECIFIED					
CHARACTERISTICS	SYMBOL	MIN	TYP	MAX	UNIT
SUPPLY VOLTAGE	VDD	4.5	5	5.5	V
LOGIC INPUT	V _{IN}	0	-	5	V
OUTPUT ON CURRENT (V _{SD} =2V)	I _{SD(ON)}	15	21	25	mA
BLINKING FREQUENCY (MODE 0)	F _{BLK0}	1.6	2	2.4	Hz
FADE IN/OUT CYCLE TIME (MODE 1)	T _{FADE}	6.4	8	9.6	Sec
BLINKING FREQUENCY (MODE 2,3)	F _{BLK23}	0.8	1	1.2	Hz

DC ELECTRICAL CHARACTERISTICS

VDD=+5V, Ta=+25°C, UNLESS OTHERWISE SPECIFIED						
PARAMETER	SYMBOL	CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY VOLTAGE	VDD		3	5	12	V
SUPPLY CURRENT	I _{DD}	Static, excluding output current	-	-	1	mA
		POWER-DOWN enable	-	-	1	μA
LOGIC INPUT VOLTAGES	V _{IH}		0.8VDD	VDD	VDD+0.1	V
	V _{IL}		VSS-0.1	VSS	0.2VDD	V
LOGIC OUTPUT VOLTAGES	V _{OH}	I _{OH} = -5mA	VDD-0.2	-	-	V
	V _{OL}	I _{OL} = +7mA	-	-	VSS+0.2	V
OUTPUT SUSTAINING VOLTAGE	V _{SD}	ALL OUTPUTS OFF	-	-	12	V
OUTPUT ON-CURRENT	I _{SD(ON)}	V _{SD} =2V	18	25	35	mA
OUTPUT OFF-CURRENT	I _{SD(OFF)}	ALL OUTPUTS OFF	-	-	1	μA
BLINKING FREQUENCY	F _{BLK0}	MODE=0	1.6	2	2.4	Hz
FADE IN/OUT CYCLE TIME	T _{FADE}	MODE=1	6.4	8	9.6	Sec
BLINKING FREQUENCY	F _{BLK23}	MODE=2,3	0.8	1	1.2	Hz

MODE SELECTION

INPUT CONTROL SIGNAL		MODE NO. & EXECUTIVE ACTIONS	
S1	S0	MODE NO.	ACTIONS
0	0	0	7-COLOR REVOLVING
0	1	1	7-COLOR FADE-IN/FADE-OUT
1	0	2	7-COLOR BLINKING
1	1	3	7-COLOR RETRIGGERABLE BLINKING



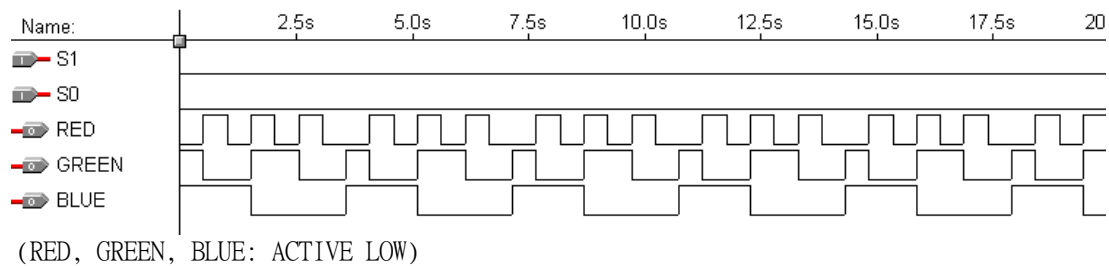
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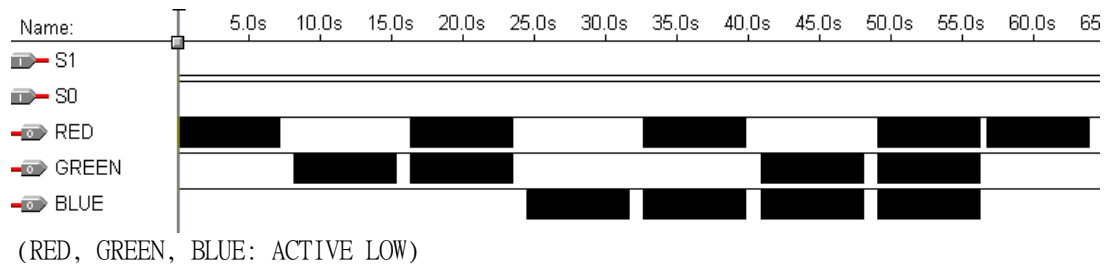
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TIMING CHART

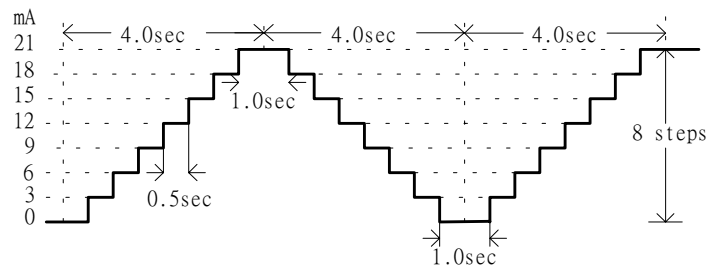
MODE=0,



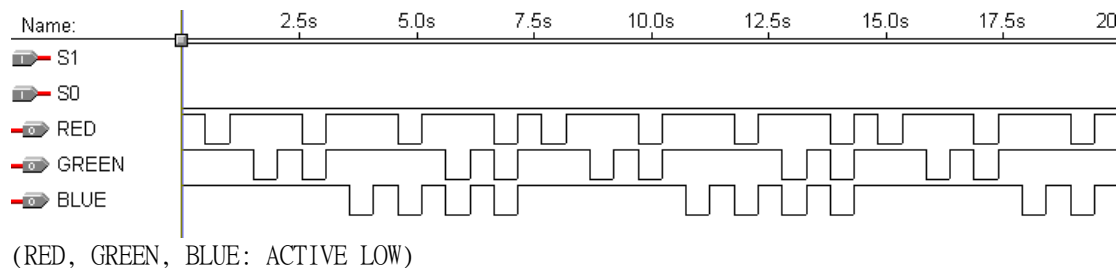
MODE=1,



* NOTE: MODE1 OUTPUT AVERAGE SOURCE CURRENT STEPS vs. TIME



MODE=2,

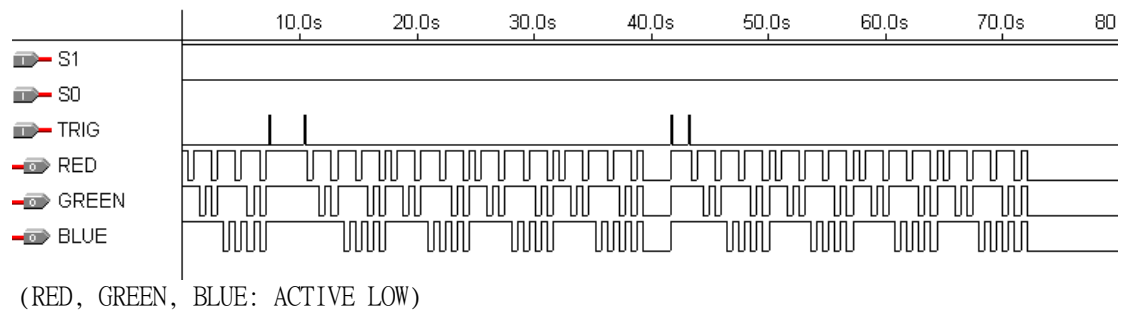


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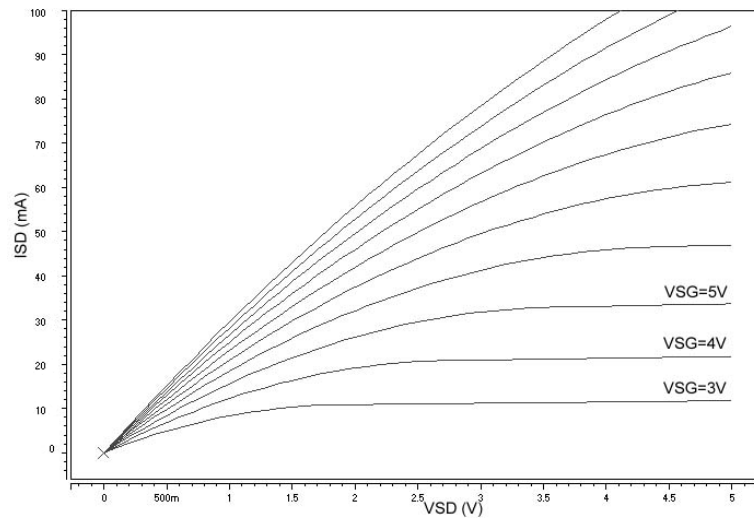
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MODE=3,



1st TRIG: DISABLE
2nd TRIG: RETRIGGER

■ TYPICAL CHARACTERISTIC CURVES



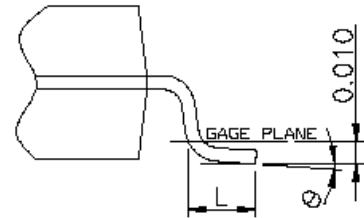
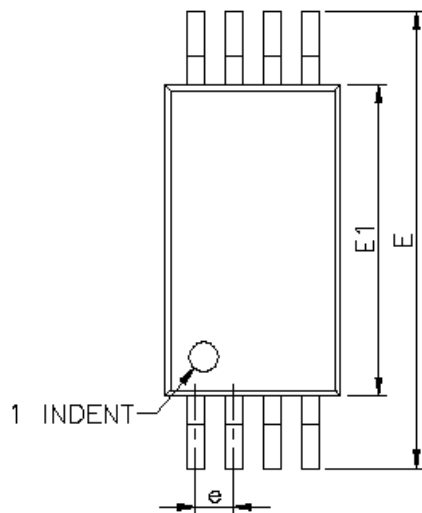
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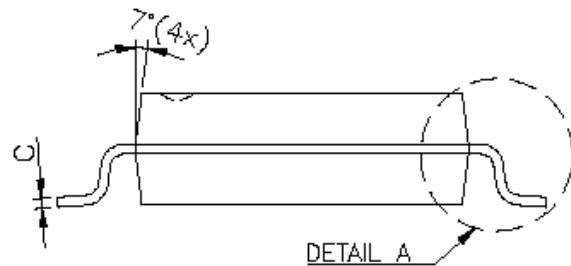
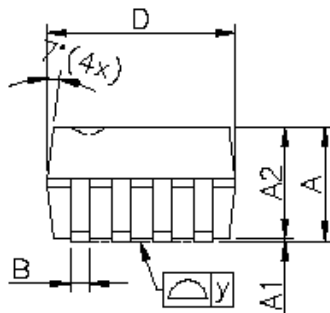
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■ PACKAGE INFORMATION

SSOP:



DETAIL A



DETAIL A

SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	—	—	2.00	—	—	0.079
A1	0.05	—	—	0.002	—	—
A2	—	1.75	—	—	0.069	—
B	0.22	0.30	0.38	0.0086	0.012	0.015
C	0.13	0.15	0.20	0.0051	0.006	0.0079
D	2.87	3.00	3.13	0.113	0.118	0.123
E	7.40	7.80	8.20	0.291	0.307	0.323
E1	5.00	5.30	5.60	0.197	0.209	0.220
e	—	0.65	—	—	0.0256	—
L	0.56	0.75	0.97	0.022	0.030	0.037
y	—	—	0.076	—	—	0.003
Ø	—	4°	8°	—	4°	8°

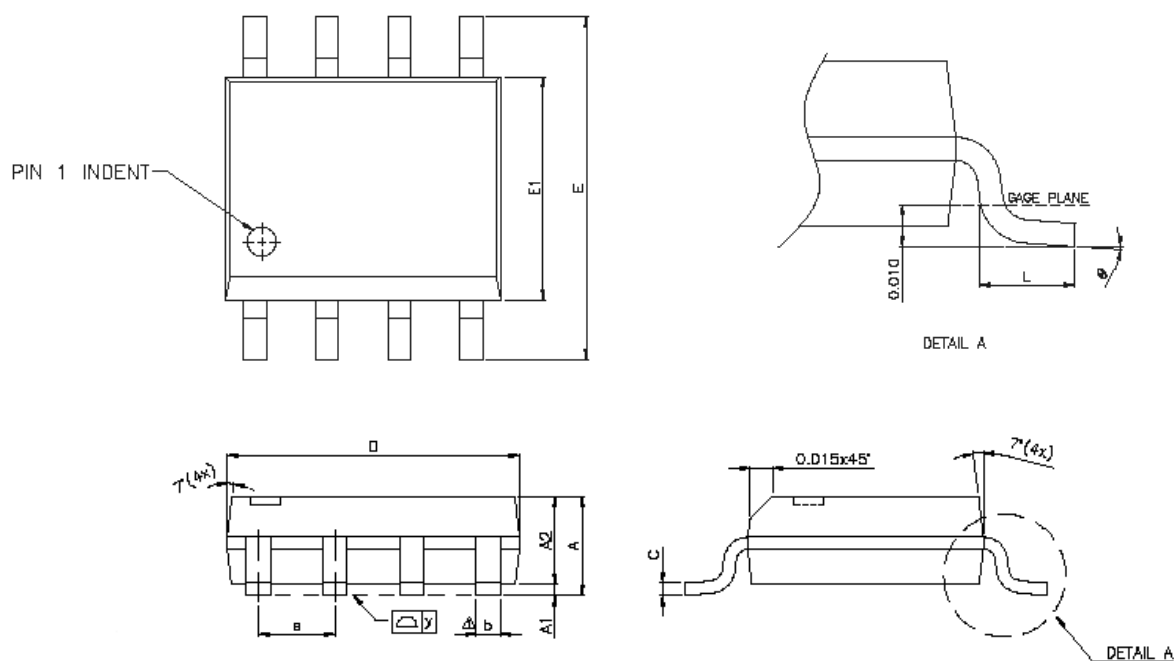


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SOP:



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	1.47	1.60	1.73	0.058	0.063	0.068
A1	0.10	—	0.25	0.004	—	0.010
A2	—	1.45	—	—	0.057	—
b	0.33	0.41	0.51	0.013	0.016	0.020
c	0.19	0.20	0.25	0.0075	0.008	0.0098
D	4.80	4.85	4.95	0.189	0.191	0.195
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	—	1.27	—	—	0.050	—
L	0.38	0.71	1.27	0.015	0.028	0.050
Δy	—	—	0.076	—	—	0.003
ϕ	0°	—	8°	0°	—	8°



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