



SCT5020 Verification Report

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Test Results Summary

Test Item	Measured Result	Note
(1) I_{OUT} vs. output voltage regulation	Pass	
(2) I_{OUT} vs. supply voltage regulation	Pass	
(3) Output leakage current	Pass	
(4) Current bit skew	Pass	
(5) Current chip skew	Pass	
(6) Electrical Characteristics	Pass	
(7) Maximum Ratings	Pass	
(8) Switching Characteristics	Pass	
(9) I_{out} vs. Temperature	Pass	
(10) I_{out} PWM function	Pass	OE/ pulse width=40ns
(11) Output precharge	Pass	
(12) HBM and MM	Pass	HBM>7KV;MM>350V

(1) I_{OUT}

(1.1) I_{out} vs. output voltage regulation : Pass

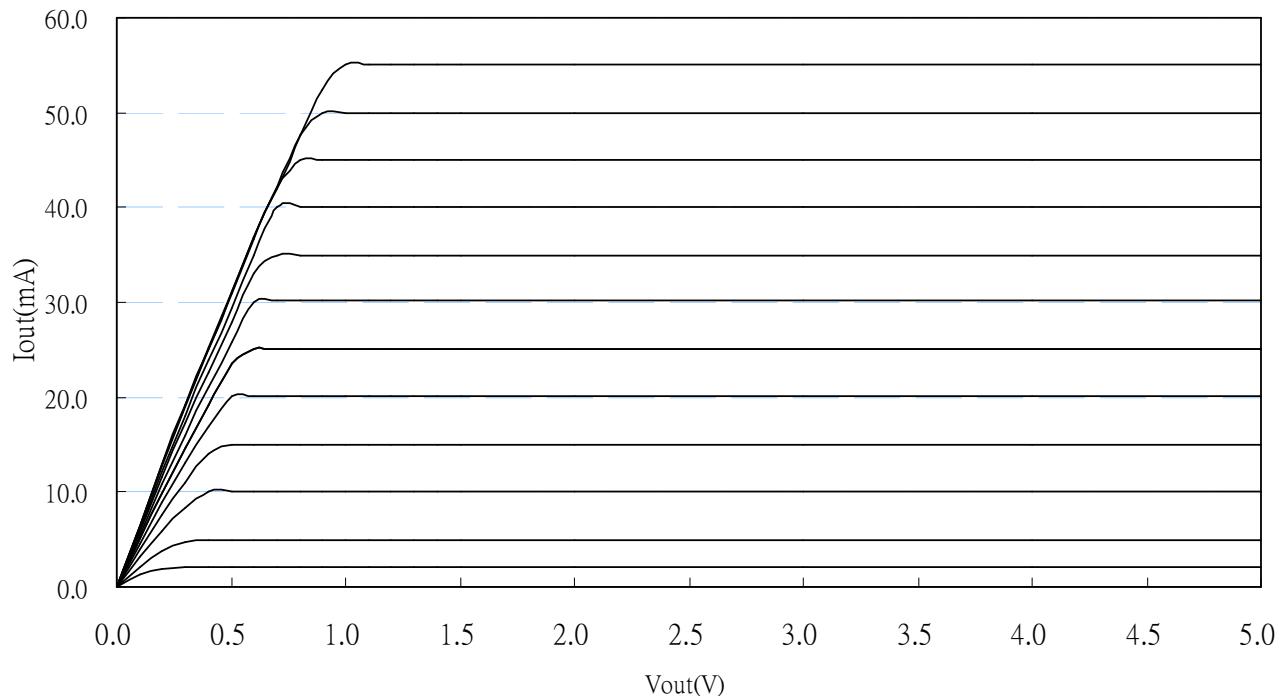
Test Conditions : $1V < V_{OUT} < 4V$, $I_{OUT}=20mA$, $V_{DD} = 5V$

Specification : $< \pm 1\% / V$

Measured Value

		Iout vs. Vout with different Rext (OUT1)																			
Rext(Ω)	V(R_{EXT})	Vout (V)																			
		0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4	1.5	2.0	3.0	4.0	5.0
9200	1.229	Iout (mA)	0.0	1.2	1.8	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
3650	1.229		0.0	2.1	3.8	4.8	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
1817	1.228		0.0	3.2	5.9	8.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
1225	1.228		0.0	3.9	7.6	10.9	14.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0	15.0
918	1.228		0.0	4.5	8.9	13.1	17.0	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2	20.2
745	1.228		0.0	5.1	9.9	14.7	19.2	23.5	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1	25.1
623	1.228		0.0	5.5	10.8	16.0	21.0	25.8	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1
540	1.228		0.0	5.9	11.6	17.2	22.7	27.9	33.1	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
477	1.227		0.0	6.2	12.2	18.1	23.9	29.5	35.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
423	1.227		0.0	6.4	12.8	19.0	25.0	30.9	36.6	42.1	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
378	1.227		0.0	6.5	12.9	19.1	25.2	31.1	36.8	42.2	47.6	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0	50.0
342	1.227		0.0	6.5	12.9	19.2	25.2	31.1	36.8	42.0	47.6	52.4	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0	55.0

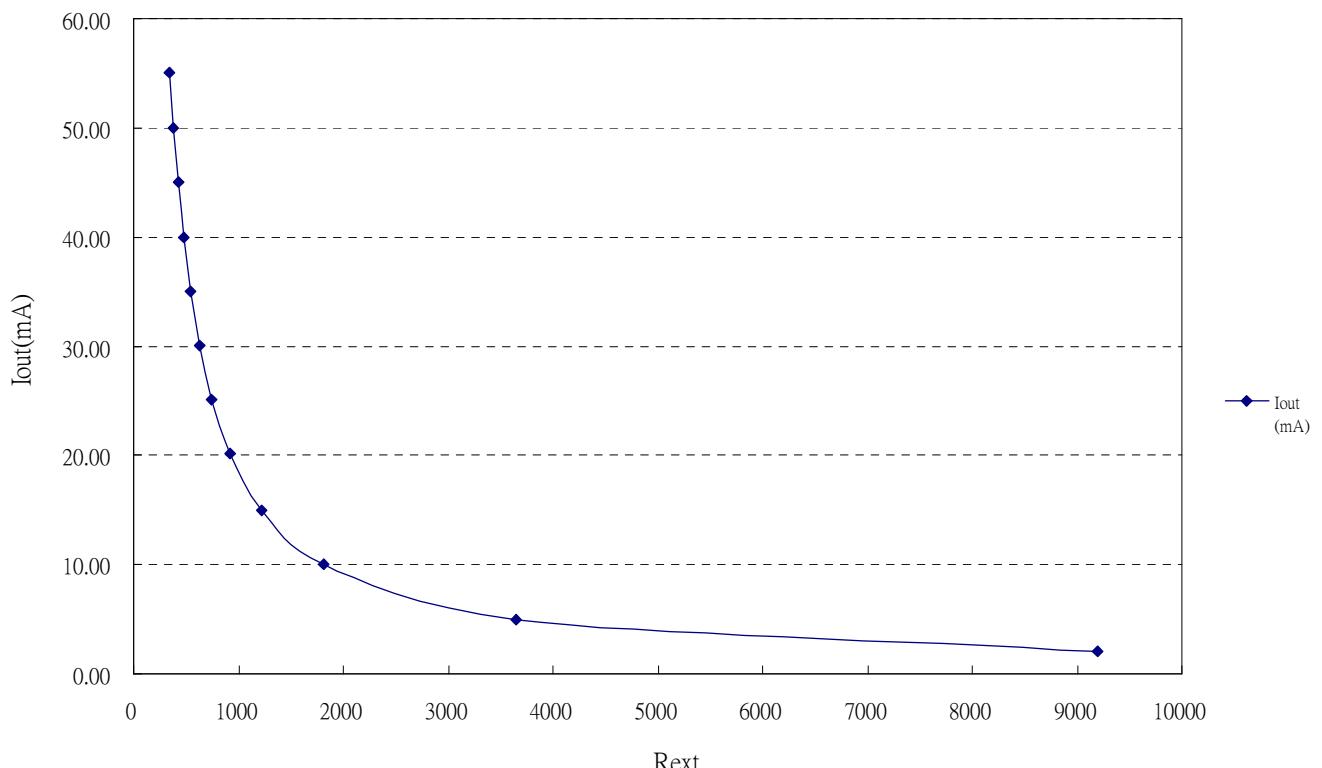
I_{out} vs. V_{out} for different R_{ext}



(1.2) I_{OUT} vs. R_{ext} : Pass

Specification : $I_{OUT} = 30(620/R_{EXT})$ mA $< \pm 1\%$

Output Current I_{out} vs. R_{ext}



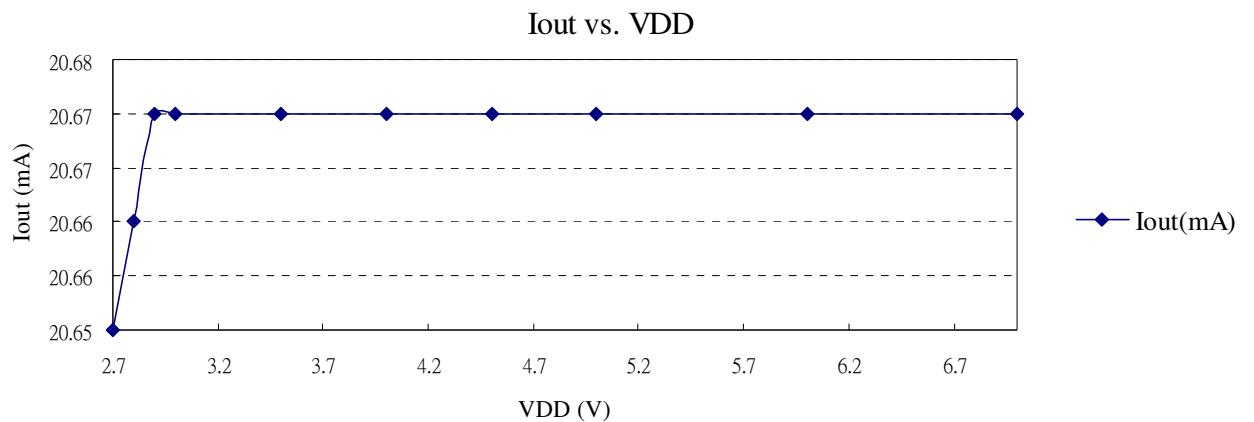
(2) I_{OUT} vs. supply voltage regulation : Pass

Test Conditions : $3V < V_{DD} < 7V$, $V_{OUT} > 1.0$ V, $R_{EXT}=918\Omega$

Specification : $< \pm 0.1\% / V$

Measured Value

V (V)	2.7	2.8	2.9	3	3.5	4	4.5	5	6	7
I (mA)	4.74	4.78	4.82	4.85	4.98	5.11	5.23	5.36	5.57	5.99
Iout(mA)	20.65	20.66	20.67	20.67	20.67	20.67	20.67	20.67	20.67	20.67



(3) Ouput leakage current : Pass

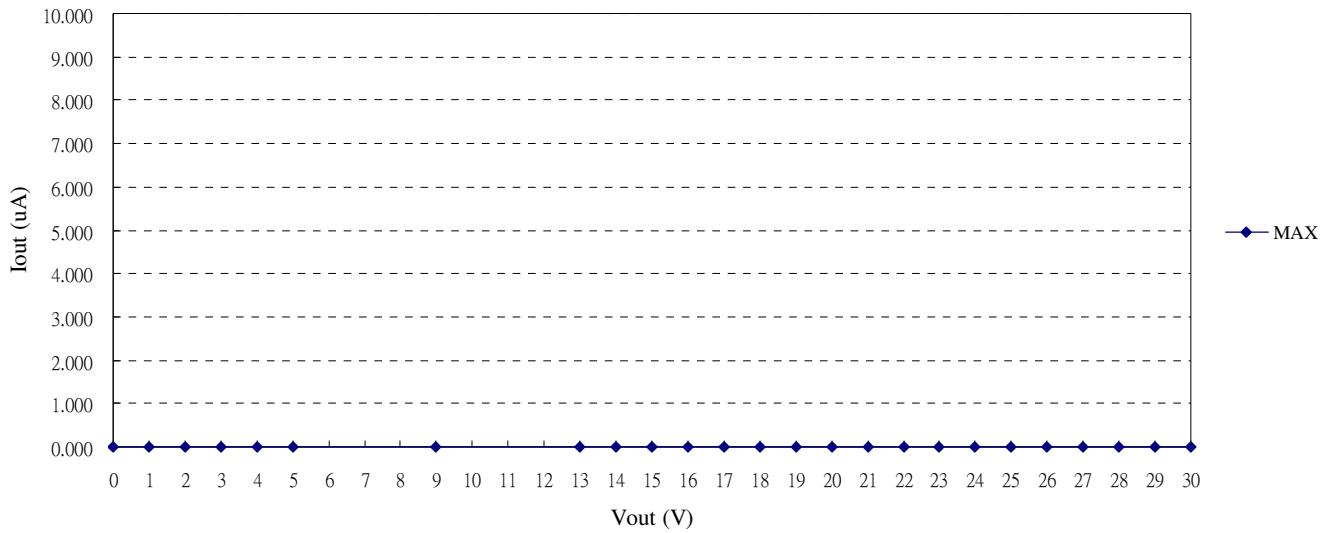
Test conditions : $V_{OUT} \geq 17$ V, OE/V_{DD}

Specification : $< 0.5\mu A$

Measured value

Vout(V)	Output leakage current																							
	0	1	2	3	4	5	9	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Iout0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout11	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout12	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout13	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout14	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Iout15	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Max.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Output Leakage Current



(4) Current skew

(4.1) Bit skew : Pass

Test Conditions : $V_{OUT} > 1.0 \text{ V}$, $R_{EXT}=918\Omega$ $I_{OUT}=20.5\text{mA}$

$$\text{Bit skew} = (\text{Bit_max}-\text{Bit_min})/\text{Bit_avg}/2$$

Specification : $< \pm 2\%$

Measured Value

IC number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
OUT0	20.68	20.44	20.66	20.43	20.42	20.65	20.73	20.20	20.75	20.63	20.99	20.52	20.51	20.87	20.93
OUT1	20.73	20.56	20.80	20.72	20.76	20.71	20.94	20.61	20.75	20.80	20.69	20.83	20.57	20.93	20.88
OUT2	20.76	20.30	20.73	20.53	20.60	20.58	20.91	20.43	20.83	20.56	20.89	20.74	20.38	21.10	20.96
OUT3	21.04	20.19	20.68	20.69	20.52	20.50	20.99	20.44	20.61	20.86	20.99	20.85	20.45	20.94	21.13
OUT4	20.80	20.27	20.56	20.52	20.56	20.44	20.96	20.18	20.78	20.81	20.86	20.82	20.67	20.86	20.82
OUT5	20.76	20.41	20.74	20.44	20.36	20.63	20.89	20.33	20.54	20.52	20.90	20.48	20.48	20.69	20.82
OUT6	20.90	20.52	20.69	20.73	20.58	20.62	20.90	20.40	20.82	20.42	20.79	20.82	20.56	20.96	20.86
OUT7	20.68	20.27	20.43	20.62	20.54	20.66	20.85	20.57	20.43	20.50	20.80	20.59	20.36	20.81	20.97
OUT8	20.59	20.37	20.68	20.61	20.48	20.49	20.80	20.26	20.49	20.61	20.61	20.68	20.27	20.73	20.87
OUT9	20.75	20.42	20.65	20.70	20.48	20.47	20.86	20.35	20.68	20.54	20.64	21.05	20.54	20.84	20.96
OUT10	20.88	20.36	20.58	20.60	20.60	20.68	20.90	20.52	20.70	20.58	20.98	20.77	20.45	20.76	20.95
OUT11	20.88	20.44	20.85	20.57	20.58	20.60	20.97	20.39	20.86	20.69	20.90	20.80	20.38	20.84	20.86
OUT12	20.89	20.58	20.94	20.58	20.65	20.75	20.73	20.20	20.69	20.65	20.91	20.99	20.78	21.07	20.80
OUT13	20.88	20.61	20.68	20.50	20.50	20.51	20.67	20.52	20.67	20.69	20.86	20.68	20.59	20.96	20.82
OUT14	20.90	20.43	20.86	20.62	20.74	20.65	20.85	20.47	20.52	20.73	21.07	20.70	20.61	20.99	20.90
OUT15	20.91	20.38	20.56	20.54	20.71	20.44	20.82	20.43	20.74	20.75	20.75	20.77	20.74	20.90	20.93
Min	20.59	20.19	20.43	20.43	20.36	20.44	20.67	20.18	20.43	20.42	20.61	20.48	20.27	20.69	20.80
Max	21.04	20.61	20.94	20.73	20.76	20.75	20.99	20.61	20.86	20.86	21.07	21.05	20.78	21.10	21.13
Ave	20.81	20.41	20.69	20.59	20.57	20.59	20.86	20.39	20.67	20.65	20.85	20.76	20.52	20.89	20.91
Bit Skew	1.09	1.01	1.23	0.73	0.96	0.77	0.78	1.05	1.04	1.06	1.09	1.37	1.26	0.97	0.79

IC number	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
OUT0	21.042	20.402	20.499	20.394	20.977	20.346	20.904	20.985	20.491	20.718	20.742	20.726	20.418	20.742	20.621
OUT1	21.195	20.564	20.564	20.637	20.831	20.305	20.977	20.953	20.313	20.718	20.75	20.864	20.548	20.58	20.912
OUT2	20.742	20.613	20.499	20.321	20.694	20.41	21.017	20.702	20.435	20.799	20.807	20.645	20.645	20.71	20.588
OUT3	21.009	20.426	20.354	20.467	20.677	20.532	21.017	21.001	20.208	20.783	20.888	20.807	20.426	20.637	20.823
OUT4	20.912	20.281	20.588	20.443	20.799	20.329	21.05	20.831	20.362	20.629	20.613	20.726	20.516	20.661	20.815
OUT5	20.766	20.232	20.2	20.435	20.75	20.362	20.92	20.718	20.305	20.637	20.758	20.912	20.677	20.613	20.912
OUT6	20.961	20.459	20.354	20.346	20.944	20.362	20.961	20.88	20.386	20.548	20.613	20.677	20.532	20.677	20.758
OUT7	20.799	20.289	20.402	20.257	20.775	20.346	20.928	20.791	20.176	20.54	20.629	20.588	20.459	20.305	20.944
OUT8	20.467	20.37	20.426	20.273	20.847	20.321	20.775	20.677	20.273	20.629	20.37	20.58	20.516	20.532	20.92
OUT9	20.702	20.548	20.208	20.451	20.807	20.346	20.847	20.969	20.087	20.54	20.58	20.645	20.532	20.855	20.872
OUT10	21.009	20.418	20.548	20.24	20.596	20.216	20.993	20.685	20.402	20.758	20.791	20.524	20.588	20.677	21.066
OUT11	20.855	20.491	20.159	20.378	20.847	20.467	20.936	20.831	20.483	20.75	20.75	20.734	20.402	20.653	20.734
OUT12	20.661	20.451	20.459	20.329	20.864	20.354	20.936	20.936	20.362	20.71	20.783	20.791	20.289	20.605	20.872
OUT13	20.718	20.516	20.516	20.378	20.742	20.451	20.775	20.831	20.71	20.645	20.694	20.847	20.661	20.637	20.985
OUT14	20.677	20.362	20.491	20.556	20.742	20.459	20.734	20.88	20.435	20.758	20.702	20.766	20.475	20.661	20.677
OUT15	20.702	20.289	20.346	20.386	20.872	20.394	20.944	20.904	20.305	20.467	20.75	20.685	20.564	20.524	20.872
Min	20.47	20.23	20.16	20.24	20.60	20.22	20.73	20.68	20.09	20.47	20.37	20.52	20.29	20.31	20.59
Max	21.20	20.61	20.59	20.64	20.98	20.53	21.05	21.00	20.71	20.80	20.89	20.91	20.68	20.86	21.07
Ave	20.83	20.42	20.41	20.40	20.80	20.37	20.92	20.85	20.36	20.66	20.69	20.72	20.51	20.62	20.83
Bit Skew	1.75	0.93	1.05	0.97	0.92	0.78	0.76	0.78	1.53	0.80	1.25	0.94	0.95	1.33	1.15

(4.2) Chip skew : Pass

Test Conditions : V_{OUT} > 1.0 V, R_{EXT}=918Ω I_{OUT}=20.5mA

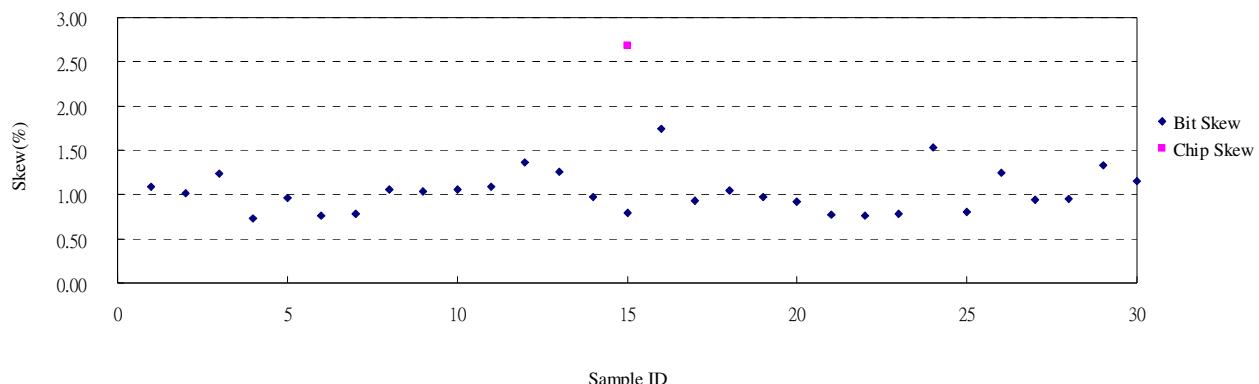
$$\text{Chip skew} = (\text{Chip_max} - \text{Chip_min}) / \text{Chip_ave}/2$$

Specification : < ±3%

Measured Value

Chip Min (mA)	Chip Max (mA)	Chip Ave (mA)	ChIP Skew (%)
20.09	21.20	20.65	±2.68

Chip and Bit skew trend chart



(5) Electrical Characteristics : Pass

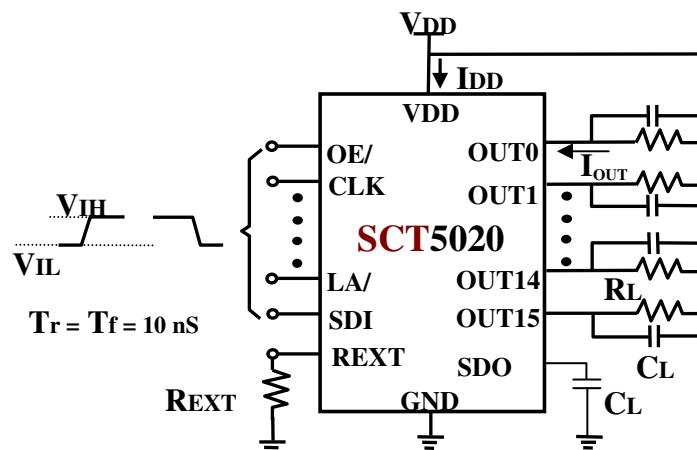
Characteristic	Test Conditions		Min.	Typ.	Max.	Unit	
Input voltage	VDD=5.0V	0.7VDD	-	VDD	V		
		0	-	0.3VDD	V		
SDI Input voltage		2.8		VDD	V		
		0		1.8	V		
CLK Input voltage		3		VDD	V		
		0		1.7	V		
LE/ Input voltage		2.9		VDD	V		
		0		1.8	V		
OE/ Input voltage		3.1		VDD	V		
		0		1.7	V		
Supply current	OFF	$R_{EXT} = \text{Open}$, $V_{DD} = 5V$ $OUT0 \sim OUT15 = \text{Off}$	2.059		2.928	mA (Test Number: 8055 pcs)	
		$R_{EXT} = 900 \Omega$, $V_{DD} = 5V$ $OUT0 \sim OUT15 = \text{Off}$	4.794		5.73		
	ON	$R_{EXT} = 900 \Omega$, $V_{DD} = 5V$ $OUT0 \sim OUT15 = \text{On}$	4.84		5.795		

(6) Maximum Ratings : Pass

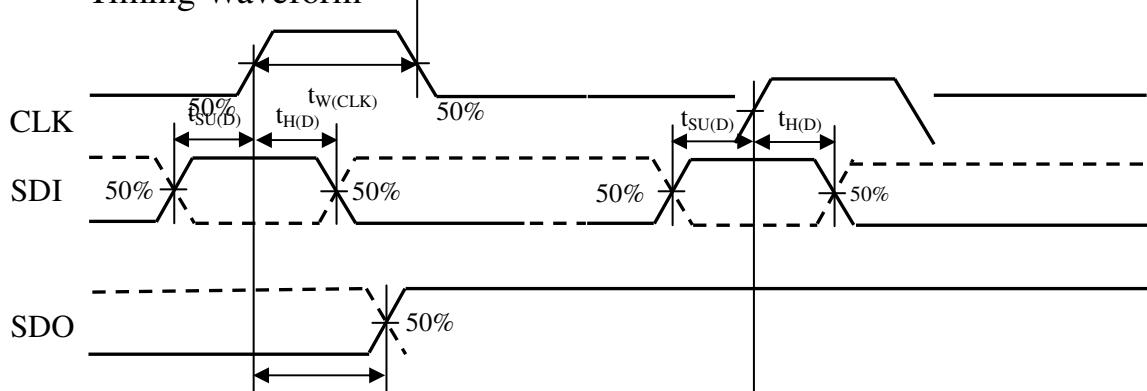
Characteristic	Rating	Unit
Supply voltage	10	V
Input voltage	-0.2 ~ $V_{DD}+0.2$	V
Output current		mA/Channel
Output voltage	-0.2 ~ 30.0	V
Total GND terminals current		mA

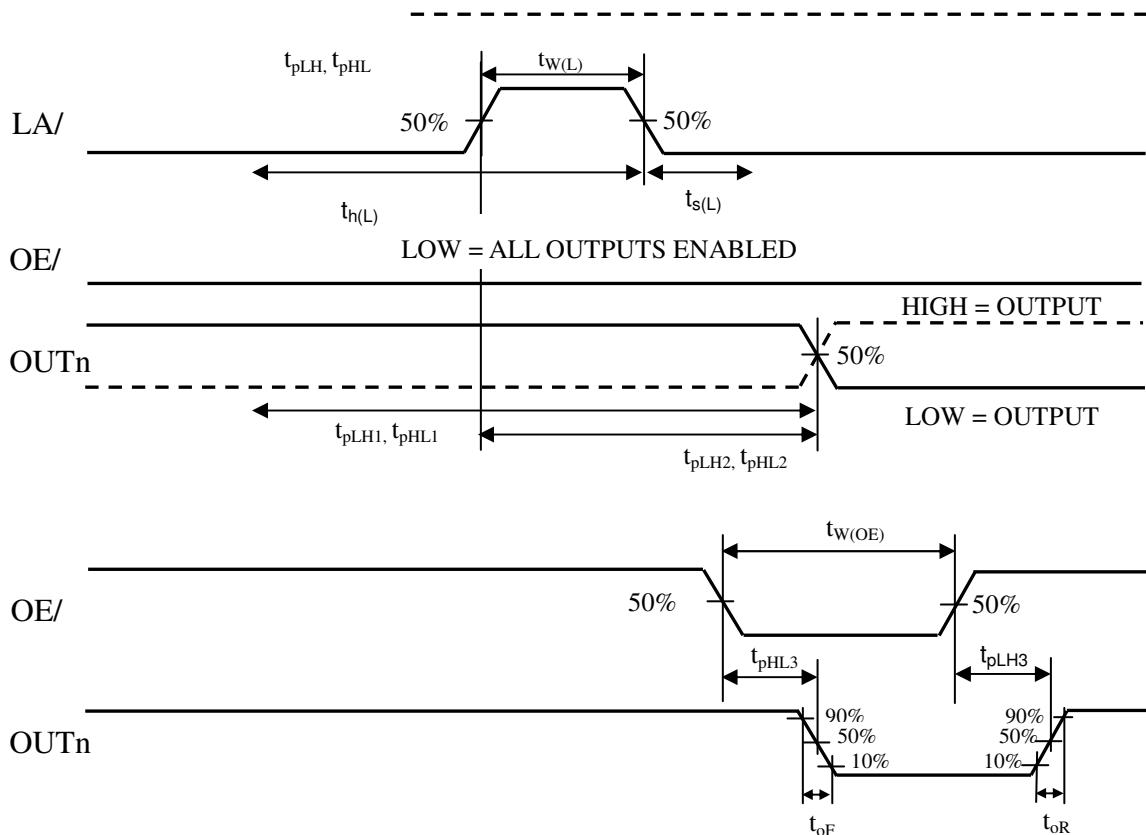
(7) Switching Characteristics : Pass

Test Circuit



Timing Waveform

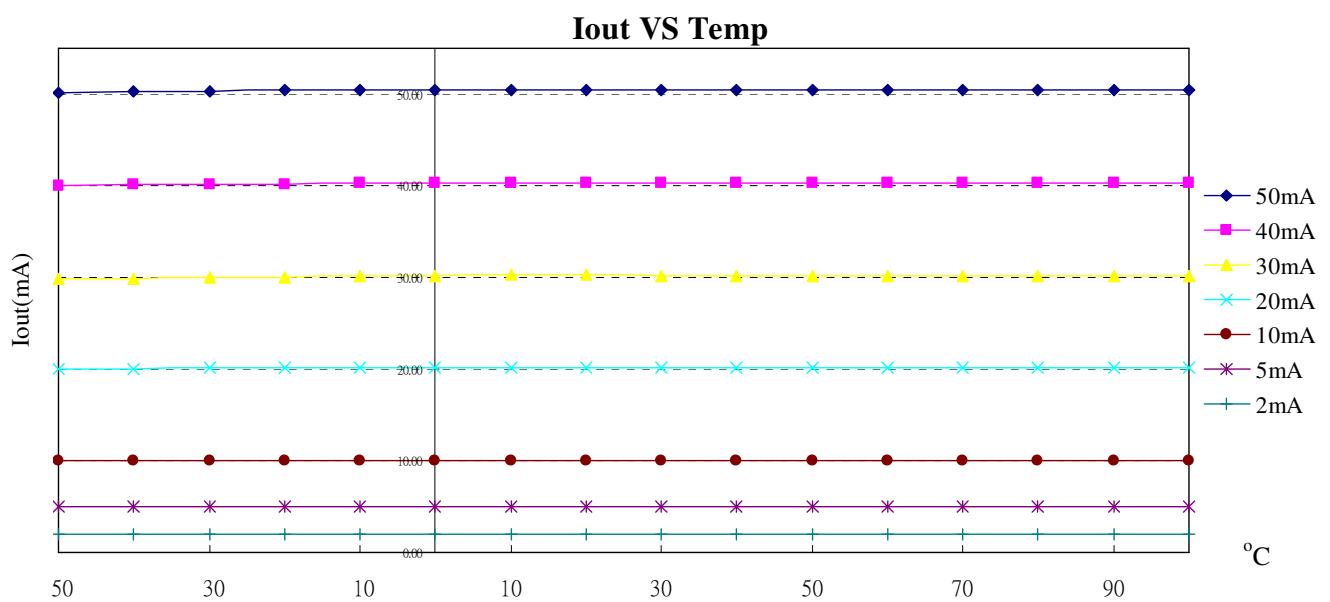




Characteristic	Condition	VDD= 5.0V	VDD= 3.3V	Unit	
Propagation Delay Time ("L" to "H")	CLK - OUTn	V _{DD} =3.3/5V, V _{LED} =5 V R _{EXT} =900Ω R _L =180Ω C _L =10pF C1=1uF	200	100	ns
	LA/ - OUTn		240	200	ns
	OE/ - OUTn		512	328	ns
	CLK - SDO		20	20	ns
Propagation Delay Time ("H" to "L")	CLK - OUTn	V _{DD} =3.3/5V, V _{LED} =5 V R _{EXT} =900Ω R _L =180Ω C _L =10pF C1=1uF	120	80	ns
	LA/ - OUTn		120	120	ns
	OE/ - OUTn		40	40	ns
	CLK - SDO		20	20	ns
	SDO rise time		3.53	3.67	ns
SDO fall time			3.25	3.39	ns
Output rise time of IOUT			94	87	ns
Output fall time of IOUT			46	23	ns

(8) Iout vs. Temperature : Pass

Iout vs. IC surface temperature							
(°C)	Iout(m A)						
50	2.01	5.00	10.00	19.97	29.89	40.00	50.20
40	2.01	5.00	10.01	20.00	29.90	40.10	50.25
30	2.01	5.00	10.01	20.10	30.00	40.20	50.30
20	2.01	5.00	10.01	20.10	30.07	40.21	50.40
10	2.01	5.00	10.02	20.11	30.10	40.23	50.46
0	2.01	5.01	10.02	20.13	30.20	40.25	50.48
10	2.01	5.01	10.03	20.12	30.23	40.30	50.48
20	2.01	5.01	10.04	20.13	30.23	40.33	50.48
30	2.01	5.01	10.04	20.13	30.22	40.32	50.47
40	2.01	5.01	10.04	20.12	30.22	40.31	50.46
50	2.01	5.01	10.04	20.12	30.21	40.31	50.45
60	2.01	5.01	10.03	20.11	30.20	40.30	50.44
70	2.00	5.00	10.03	20.11	30.20	40.29	50.43
80	2.00	5.00	10.03	20.11	30.19	40.28	50.42
90	2.00	5.00	10.03	20.10	30.18	40.27	50.41
100	2.00	5.00	10.03	20.10	30.17	40.27	50.40
$\pm I_{OUT}/^{\circ}C \%$	0.002%	0.001%	0.001%	0.003%	0.004	0.003	0.002

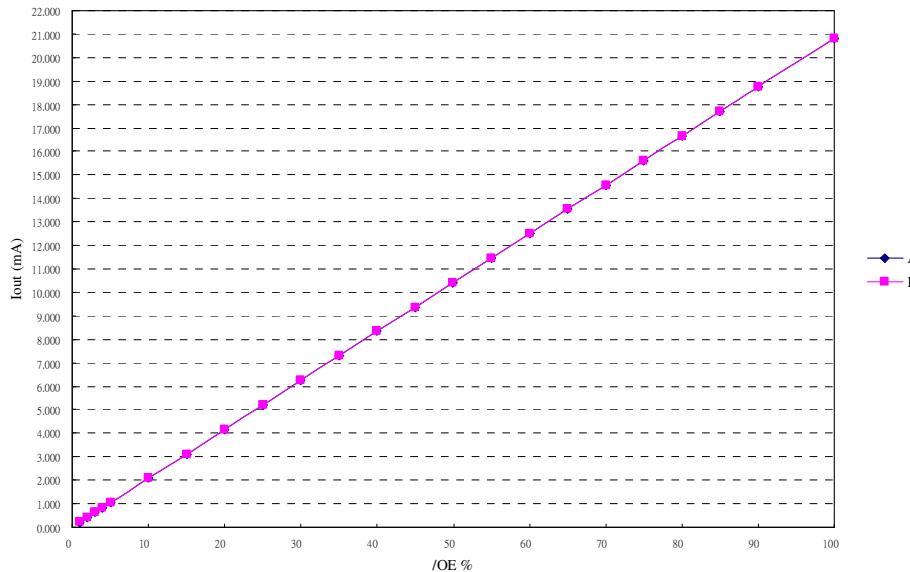


(9) Iout PWM function

(9.1) OE/ = 100ns (20.8mA) : Pass

OE/		Measured Value A	Ideal Value B	A-B	(A-B)/B
Duty	Pulsewidth	IOUT(mA)	IOUT(mA)		
1%	100nS	0.204	0.208	-0.004	-2.05%
2%	200nS	0.414	0.417	-0.003	-0.61%
3%	300nS	0.623	0.625	-0.002	-0.29%
4%	400ns	0.832	0.833	-0.001	-0.13%
5%	500ns	1.039	1.041	-0.002	-0.23%
10%	1us	2.082	2.083	-0.001	-0.03%
15%	1.5us	3.123	3.124	-0.001	-0.03%
20%	2us	4.164	4.165	-0.001	-0.03%
25%	2.5us	5.206	5.207	-0.001	-0.01%
30%	3us	6.248	6.248	0.000	0.00%
35%	3.5us	7.289	7.289	0.000	-0.01%
40%	4us	8.331	8.331	0.000	0.00%
45%	4.5us	9.372	9.372	0.000	0.00%
50%	5us	10.413	10.414	0.000	0.00%
55%	5.5us	11.455	11.455	0.000	0.00%
60%	6us	12.497	12.496	0.001	0.01%
65%	6.5us	13.538	13.538	0.000	0.00%
70%	7us	14.578	14.579	-0.001	-0.01%
75%	7.5us	15.619	15.620	-0.001	-0.01%
80%	8us	16.660	16.662	-0.002	-0.01%
85%	8.5us	17.701	17.703	-0.002	-0.01%
90%	9us	18.741	18.744	-0.003	-0.02%
100%	10us	20.827	20.827	0.000	0.00%

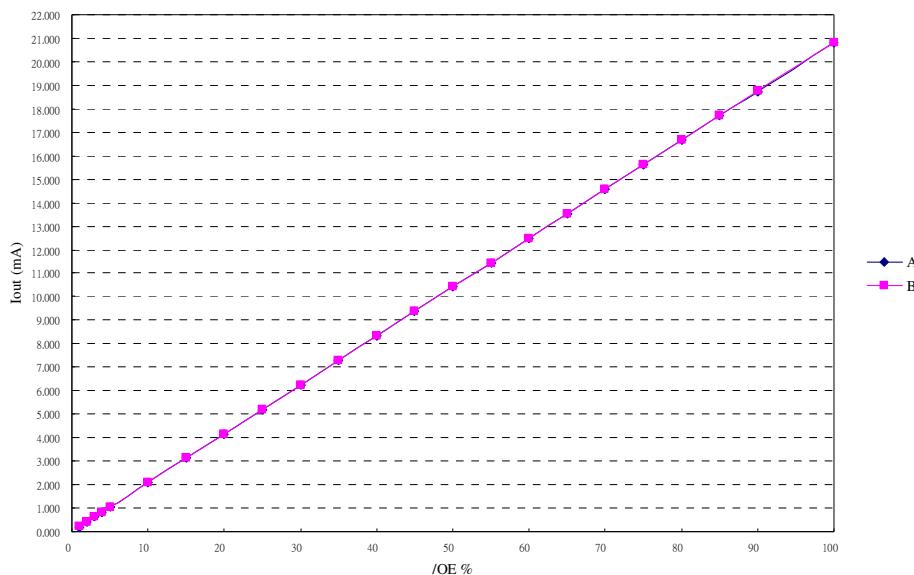
Iout PWM (100nS)



(9.2) OE/ = 70ns (20.8mA) : Pass

OE/		Measured Value A	Ideal Value B	A-B	(A-B)/B
Duty	pulse width	Iout(mA)	Iout(mA)		
1%	70nS	0.20	0.21	-0.01	-5.89%
2%	140nS	0.41	0.42	0.00	-0.85%
3%	210nS	0.62	0.62	0.00	-0.45%
4%	280ns	0.83	0.83	0.00	-0.25%
5%	350ns	1.04	1.04	0.00	-0.23%
10%	700ns	2.08	2.08	0.00	-0.08%
15%	1.05us	3.12	3.12	0.00	-0.03%
20%	1.4us	4.16	4.17	0.00	-0.03%
25%	1.75us	5.21	5.21	0.00	-0.03%
30%	2.1us	6.25	6.25	0.00	-0.03%
35%	2.45us	7.29	7.29	0.00	-0.02%
40%	2.8us	8.33	8.33	0.00	-0.03%
45%	3.5us	9.37	9.37	0.00	-0.02%
50%	3.5us	10.41	10.41	0.00	-0.03%
55%	3.85us	11.45	11.45	0.00	-0.02%
60%	4.2us	12.49	12.50	0.00	-0.03%
65%	4.55us	13.53	13.54	0.00	-0.03%
70%	4.9us	14.58	14.58	0.00	-0.03%
75%	5.25us	15.62	15.62	0.00	-0.01%
80%	5.6us	16.66	16.66	0.00	-0.02%
85%	5.95us	17.70	17.70	0.00	-0.02%
90%	6.3us	18.74	18.74	0.00	-0.02%
100%	7us	20.83	20.83	0.00	0.00%

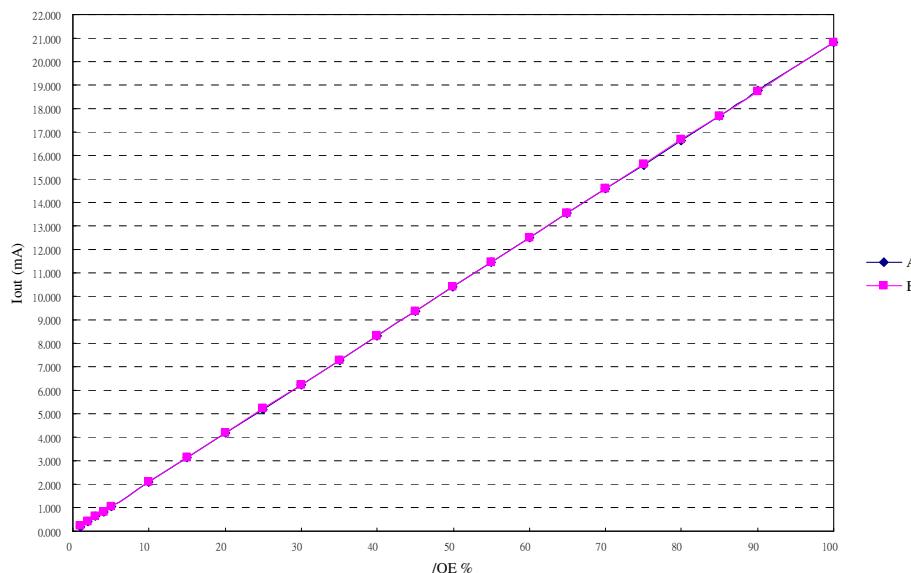
Iout PWM (70nS)



(9.3) OE/ = 40ns (20.8mA) : Pass

OE/		measured Value A	Ideal Value B	A-B	(A-B)/B
Duty	Pulse width	Iout(mA)	Iout(mA)		
1%	40nS	0.17	0.21	-0.04	-20.30%
2%	80nS	0.40	0.42	-0.02	-3.97%
3%	120nS	0.62	0.62	-0.01	-1.41%
4%	160ns	0.83	0.83	-0.01	-0.85%
5%	200ns	1.03	1.04	-0.01	-0.71%
10%	400ns	2.08	2.08	0.00	-0.23%
15%	600ns	3.12	3.12	0.00	-0.13%
20%	800ns	4.16	4.17	0.00	-0.11%
25%	1us	5.20	5.21	0.00	-0.09%
30%	1.2us	6.24	6.25	-0.01	-0.08%
35%	1.4us	7.29	7.29	0.00	-0.06%
40%	1.6us	8.33	8.33	0.00	-0.05%
45%	1.8us	9.37	9.37	-0.01	-0.05%
50%	2us	10.41	10.41	0.00	-0.04%
55%	2.2us	11.45	11.45	-0.01	-0.05%
60%	2.4us	12.49	12.50	-0.01	-0.04%
65%	2.6us	13.53	13.54	-0.01	-0.04%
70%	2.8us	14.57	14.58	0.00	-0.03%
75%	3us	15.61	15.62	-0.01	-0.05%
80%	3.2us	16.66	16.66	0.00	-0.02%
85%	3.4us	17.70	17.70	0.00	-0.02%
90%	3.6us	18.75	18.74	0.01	0.05%
100%	4us	20.83	20.83	0.00	0.00%

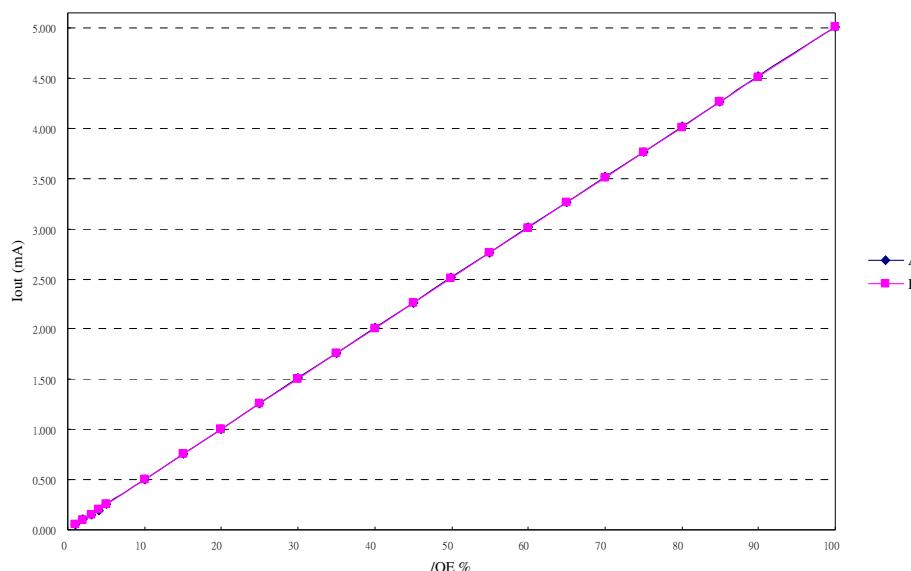
Iout PWM (40nS)



(9.4) OE/ = 40ns (5mA) : Pass

OE/		measured Value A	Ideal Value B	A-B	(A-B)/B
Duty	Pulse width	Iout(mA)	Iout(mA)		
1%	40nS	0.058	0.050	0.008	15.70%
2%	80nS	0.104	0.100	0.004	3.73%
3%	120nS	0.146	0.150	-0.004	-2.92%
4%	160ns	0.197	0.201	-0.004	-1.76%
5%	200ns	0.251	0.251	0.000	0.14%
10%	400ns	0.504	0.501	0.003	0.54%
15%	600ns	0.756	0.752	0.004	0.54%
20%	800ns	1.007	1.003	0.004	0.44%
25%	1us	1.259	1.253	0.006	0.46%
30%	1.2us	1.510	1.504	0.006	0.41%
35%	1.4us	1.761	1.755	0.006	0.37%
40%	1.6us	2.011	2.005	0.006	0.29%
45%	1.8us	2.262	2.256	0.006	0.27%
50%	2us	2.512	2.507	0.006	0.22%
55%	2.2us	2.763	2.757	0.006	0.21%
60%	2.4us	3.014	3.008	0.006	0.21%
65%	2.6us	3.265	3.258	0.007	0.20%
70%	2.8us	3.515	3.509	0.006	0.17%
75%	3us	3.766	3.760	0.006	0.17%
80%	3.2us	4.017	4.010	0.007	0.16%
85%	3.4us	4.268	4.261	0.007	0.16%
90%	3.6us	4.521	4.512	0.009	0.21%
100%	4us	5.013	5.013	0.000	0.00%

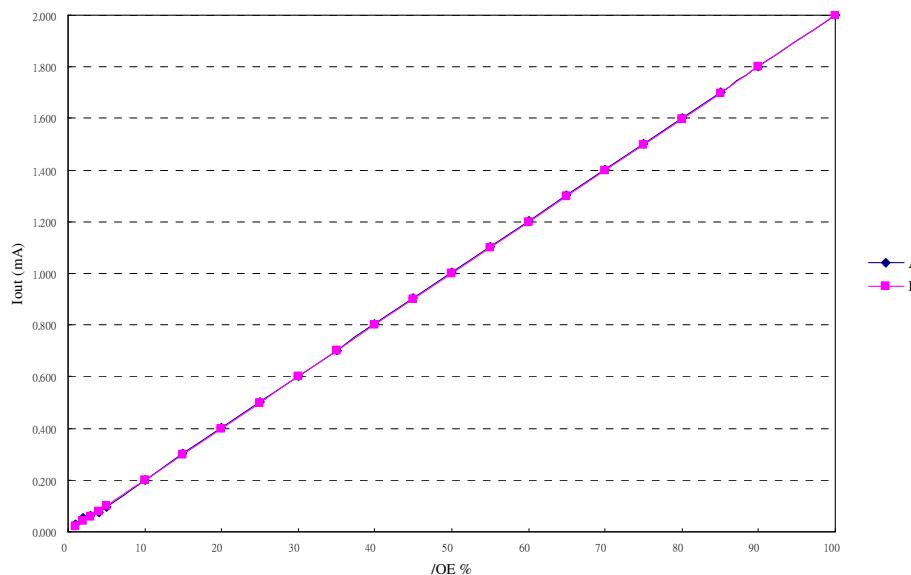
Iout PWM (40nS)



(9.5) OE/ = 40ns (2mA) : Pass

OE/		measured Value A	Ideal Value B	A-B	(A-B)/B
Duty	Pulse width	Iout(mA)	Iout(mA)		
1%	40nS	0.031	0.020	0.011	55.08%
2%	80nS	0.054	0.040	0.014	35.07%
3%	120nS	0.064	0.060	0.004	6.72%
4%	160ns	0.076	0.080	-0.004	-4.95%
5%	200ns	0.097	0.100	-0.003	-2.95%
10%	400ns	0.200	0.200	0.000	0.05%
15%	600ns	0.302	0.300	0.002	0.72%
20%	800ns	0.403	0.400	0.003	0.80%
25%	1us	0.503	0.500	0.003	0.65%
30%	1.2us	0.603	0.600	0.003	0.55%
35%	1.4us	0.703	0.700	0.003	0.48%
40%	1.6us	0.803	0.800	0.003	0.43%
45%	1.8us	0.903	0.900	0.003	0.38%
50%	2us	1.003	0.999	0.004	0.35%
55%	2.2us	1.103	1.099	0.004	0.32%
60%	2.4us	1.203	1.199	0.004	0.30%
65%	2.6us	1.304	1.299	0.005	0.36%
70%	2.8us	1.403	1.399	0.004	0.26%
75%	3us	1.503	1.499	0.004	0.25%
80%	3.2us	1.603	1.599	0.004	0.24%
85%	3.4us	1.703	1.699	0.004	0.23%
90%	3.6us	1.801	1.799	0.002	0.11%
100%	4us	1.999	1.999	0.000	0.00%

Iout PWM (40nS)



(10) Output precharge: Pass

Test Conditions : OE=/=H, VDD=5V, Output open

Specification : VOUT < 5.0 V

Measured Value

	OUT0	OUT1	OUT2	OUT3	OUT4	OUT5	OUT6	OUT7	OUT8	OUT9	OUT10	OUT11	OUT12	OUT13	OUT14	OUT15
Iout(mA)	2.38	2.40	2.33	2.36	2.35	2.35	2.34	2.35	2.34	2.35	2.34	2.25	2.34	2.35	2.36	2.36
VOUT(V)	4.02	4.02	4.02	4.02	4.02	4.02	4.02	4.01	4.00	4.01	4.01	3.96	4.02	4.01	4.02	4.01

(11) Human Body Model (HBM) and Machine Model (MM)**HBM: Pass**Test conditions : $(\pm)500V \sim (\pm)4000V$ Step: $(\pm)500V$, $(\pm)5000V \sim (\pm)8000V$ Step:
 $(\pm)1000V$

Specification : > 2000V

Measured value: ESD Minimum Pass Level = $\pm 7000V$ **MM: Pass**Test conditions : $(\pm)50V \sim (\pm)200V$ Step: $(\pm)50V$, $(\pm)200V \sim (\pm)500V$ Step:
 $(\pm)100V$, $(\pm)300V \sim (\pm)500V$ Step: $(\pm)25V$

Specification : > 200V

Measured value: ESD Minimum Pass Level = $\pm 350V$