



SANYO Semiconductors DATA SHEET

L780S00 Series — Monolithic Linear IC 5 to 24V 1A 5-Pin Voltage Regulators with Strobe Pin

Features

- Output voltage
L780S05 : 5V L780S08 : 8V L780S09 : 9V
L780S10 : 10V L780S12 : 12V L780S15 : 15V
L780S18 : 18V
- The strobe pin can be used to turn ON / OFF output voltage (active-low).
- 1A output current.
- On-chip thermal protector.
- On-chip overcurrent limiter.
- On-chip ASO protector.
- The use of package TO-220-5H (5 pins) facilitates mounting and thermal design.

Specifications

[Common to L780S00 series]

Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	V _{CC} max	Pin 1	35	V
Strobe input voltage	V _{ST} max	Pin 4	18	V
Strobe input current	I _{ST} max	Pin 4	5	mA
Allowable power dissipation	Pd max		1.75	W
		T _c =25°C	20	W
Thermal resistance	θ _{j-c}		5	°C / W
Operating temperature	T _{opr}		-20 to +80	°C
Storage temperature	T _{stg}		-55 to +150	°C

Strobe Operating Characteristics at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Strobe operation start voltage	V _{st(on)}		2.4	V
Strobe operation stop voltage	V _{st(off)}		0.5	V

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L780S00 Series

[L780S05]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		7.5 to 20.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=10\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		4.8	5.0	5.2	V
	V_{O2}	$7\text{V} \leq V_{IN} \leq 20\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	4.75		5.25	V
Line regulation 1	ΔV_{OLN1}	$7\text{V} \leq V_{IN} \leq 25\text{V}$		3	100	mV
Line regulation 2	ΔV_{OLN2}	$8\text{V} \leq V_{IN} \leq 12\text{V}$		1	50	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			100	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			50	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$7\text{V} \leq V_{IN} \leq 25\text{V}$			1.3	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		40		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $8\text{V} \leq V_{IN} \leq 18\text{V}$	62	78		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

[L780S08]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		10.5 to 23.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=15\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		7.7	8.0	8.3	V
	V_{O2}	$10.5\text{V} \leq V_{IN} \leq 23\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	7.6		8.4	V
Line regulation 1	ΔV_{OLN1}	$10.5\text{V} \leq V_{IN} \leq 25\text{V}$		6.0	160	mV
Line regulation 2	ΔV_{OLN2}	$11\text{V} \leq V_{IN} \leq 17\text{V}$		2.0	80	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			160	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			80	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$10.5\text{V} \leq V_{IN} \leq 25\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		52		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $11.5\text{V} \leq V_{IN} \leq 21.5\text{V}$	56	72		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

L780S00 Series

[L780S09]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		11.5 to 25.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=16\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		8.64	9.0	9.36	V
	V_{O2}	$11.5\text{V} \leq V_{IN} \leq 24\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	8.55		9.45	V
Line regulation 1	ΔV_{OLN1}	$11.5\text{V} \leq V_{IN} \leq 25\text{V}$		7	180	mV
Line regulation 2	ΔV_{OLN2}	$12\text{V} \leq V_{IN} \leq 20\text{V}$		2	90	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			180	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			90	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$11.5\text{V} \leq V_{IN} \leq 26\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		57		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $12\text{V} \leq V_{IN} \leq 22\text{V}$	56	72		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

[L780S10]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		13.0 to 25.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=17\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		9.6	10.0	10.4	V
	V_{O2}	$12.5\text{V} \leq V_{IN} \leq 25\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	9.5		10.5	V
Line regulation 1	ΔV_{OLN1}	$12.5\text{V} \leq V_{IN} \leq 28\text{V}$		8	200	mV
Line regulation 2	ΔV_{OLN2}	$14\text{V} \leq V_{IN} \leq 20\text{V}$		2.5	100	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			200	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			100	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$12.5\text{V} \leq V_{IN} \leq 25\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		63		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $13\text{V} \leq V_{IN} \leq 23\text{V}$	55	72		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

L780S0 Series

[L780S12]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		15.0 to 27.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=19\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		11.5	12.0	12.5	V
	V_{O2}	$14.5\text{V} \leq V_{IN} \leq 27\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	11.4		12.6	V
Line regulation 1	ΔV_{OLN1}	$14.5\text{V} \leq V_{IN} \leq 30\text{V}$		10	240	mV
Line regulation 2	ΔV_{OLN2}	$16\text{V} \leq V_{IN} \leq 22\text{V}$		3	120	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			240	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			120	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$14.5\text{V} \leq V_{IN} \leq 30\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		75		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $15\text{V} \leq V_{IN} \leq 25\text{V}$	55	71		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

[L780S15]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		18.0 to 30.0	V
Output current range	I_O		5 to 1000	mA

Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=23\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		14.4	15.0	15.6	V
	V_{O2}	$17.5\text{V} \leq V_{IN} \leq 30\text{V}$, $5\text{mA} \leq I_O \leq 1\text{A}$	14.25		15.75	V
Line regulation 1	ΔV_{OLN1}	$17.5\text{V} \leq V_{IN} \leq 30\text{V}$		11	300	mV
Line regulation 2	ΔV_{OLN2}	$20\text{V} \leq V_{IN} \leq 26\text{V}$		3	150	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			300	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			150	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$17.5\text{V} \leq V_{IN} \leq 30\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		90		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $18.5\text{V} \leq V_{IN} \leq 28.5\text{V}$	54	70		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

L780S0 Series

[L780S18]

Recommended Operating Conditions at $T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Input voltage range	V_{IN}		21.0 to 33.0	V
Output current range	I_O		5 to 1000	mA

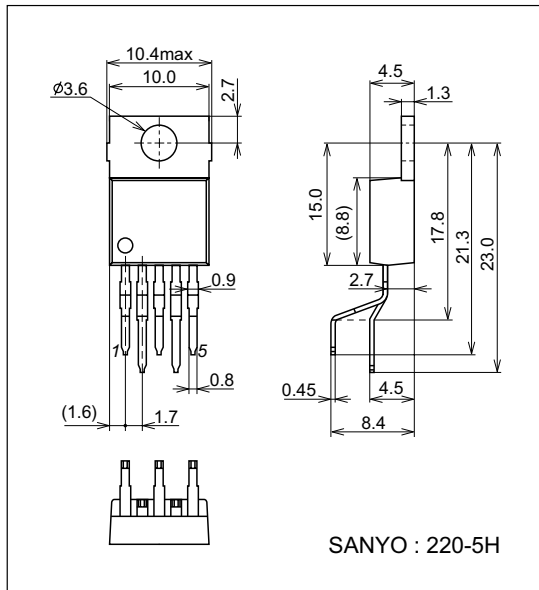
Operating Characteristics at $T_j=25^\circ\text{C}$, $V_{IN}=27\text{V}$, $I_O=500\text{mA}$, $V_{st}=0\text{V}$, $*T_a=25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_{O1}		17.3	18.0	18.7	V
	V_{O2}	$21\text{V} \leq V_{IN} \leq 33\text{V}$, $5\text{mA} \leq V_{IN} \leq 1\text{A}$	17.1		18.9	V
Line regulation 1	ΔV_{OLN1}	$21\text{V} \leq V_{IN} \leq 33\text{V}$		15	360	mV
Line regulation 2	ΔV_{OLN2}	$24\text{V} \leq V_{IN} \leq 30\text{V}$		5	180	mV
Load regulation 1	ΔV_{OLD1}	$5\text{mA} \leq I_O \leq 1.5\text{A}$			360	mV
Load regulation 2	ΔV_{OLD2}	$250\text{mA} \leq I_O \leq 750\text{mA}$			180	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	ΔI_{CCLN}	$21\text{V} \leq V_{IN} \leq 33\text{V}$			1.0	mA
Current dissipation variation (Load)	ΔI_{CCLD}	$5\text{mA} \leq I_O \leq 1\text{A}$			0.5	mA
Output noise voltage	V_{NO}	$10\text{Hz} \leq f \leq 100\text{kHz}^*$		110		μV
Ripple rejection	R_r	$f=120\text{Hz}$, $22\text{V} \leq V_{IN} \leq 32\text{V}$	53	69		dB
Dropout voltage	V_{drop}	$I_O=1\text{A}$		2.0		V
Output short current	I_{OS}	$V_{IN}=35\text{V}$		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	$V_{O(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			0.8	V
Current dissipation at strobe mode	$I_{CC(ston)}$	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			3.0	mA
Strobe input current	I_{st}	$V_{IN}=35\text{V}$, $V_{st}=5\text{V}$, $I_O=0\text{A}$, *			1.0	mA

Package Dimensions

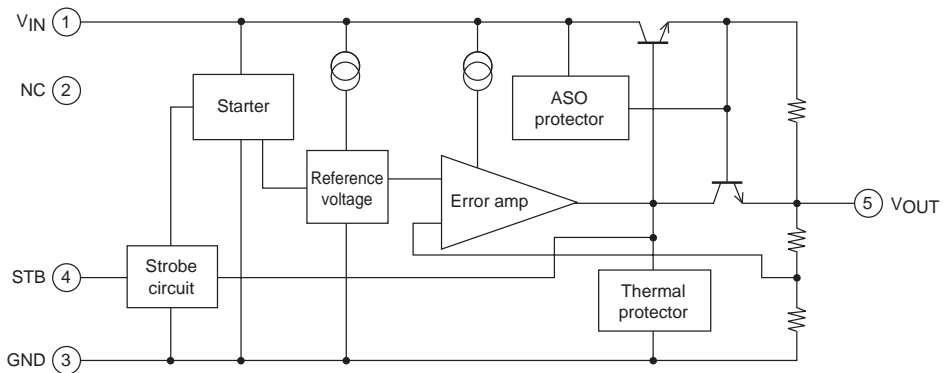
unit : mm

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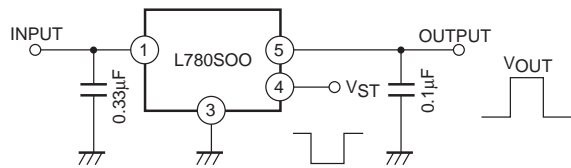
L780S00 Series

Equivalent Circuit Block Diagram

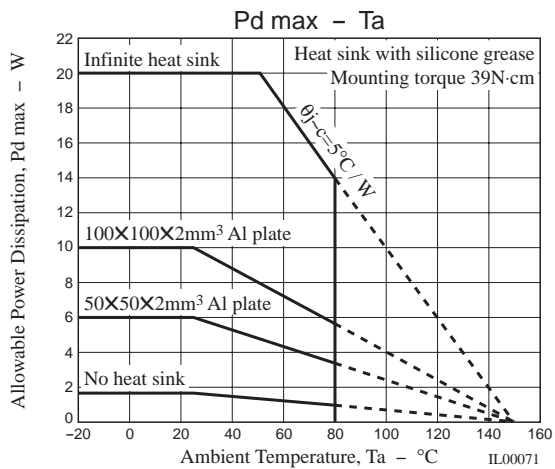


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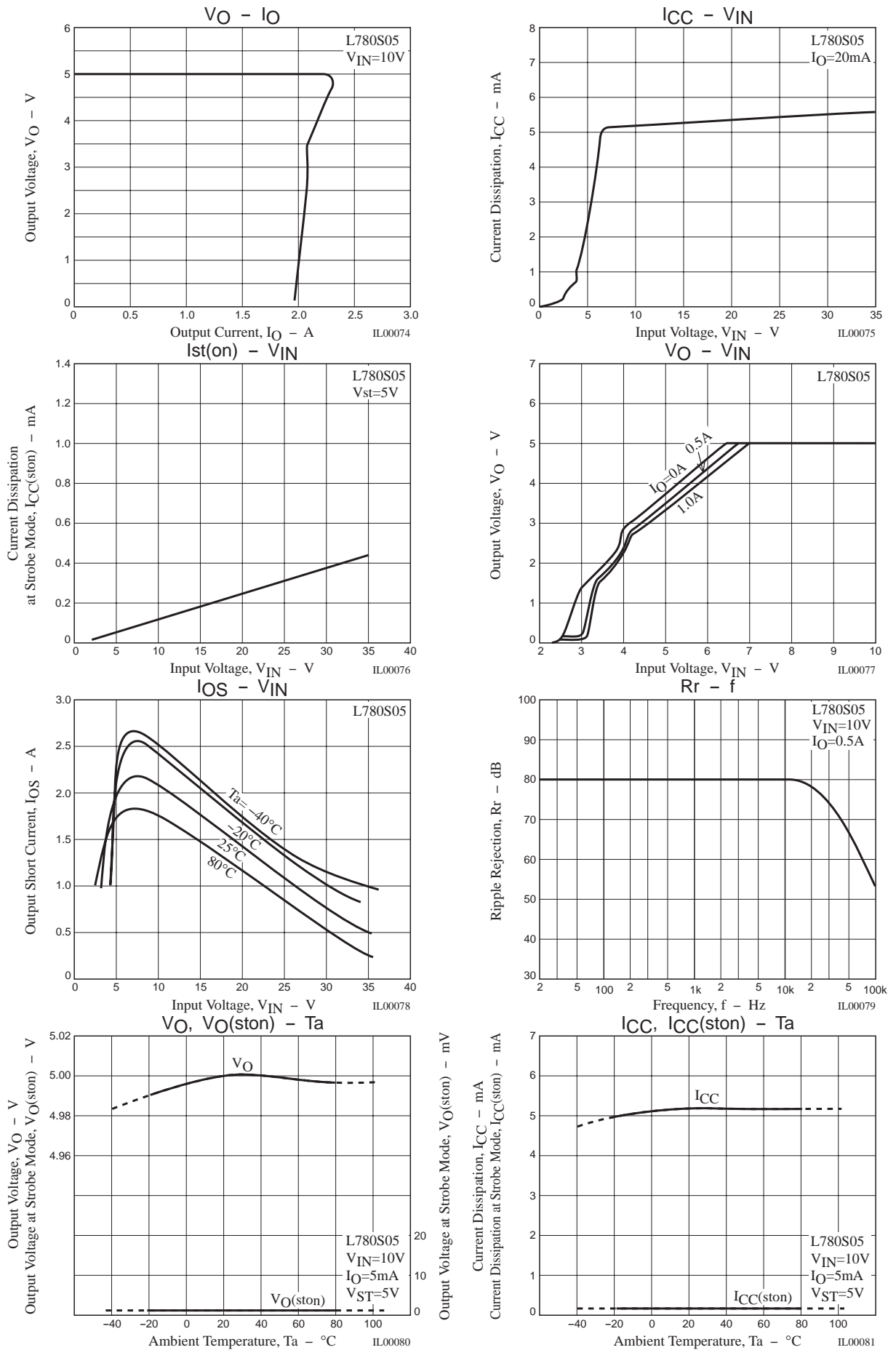
DC Characteristics Test Circuit (Common to L780S00 series)



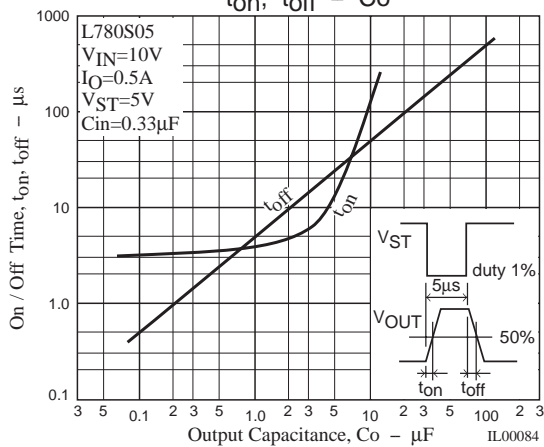
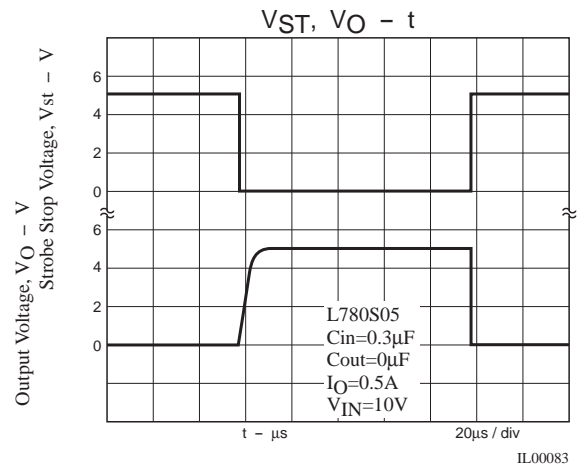
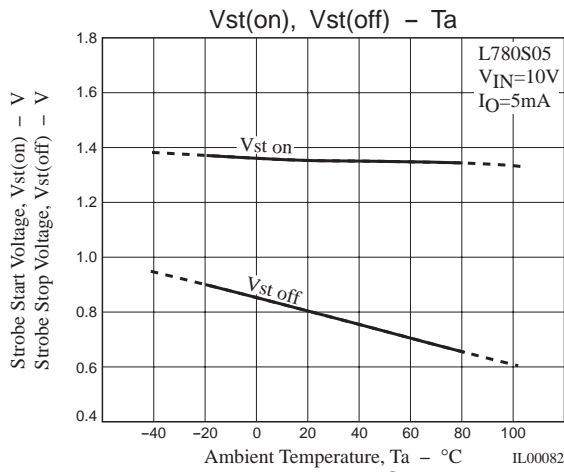
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L780S00 Series



L780S00 Series



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