Ordering number : EN1700G

SANYO Semiconductors
DATA SHEET

Monolithic Linear IC

L780S00 Series — 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
		Tc=25°C	20	W
Thermal resistance	θj-c		5	°C / W
Operating temperature	Topr		-20 to +80	°C
Storage temperature	Tstg		-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

SANYO Semiconductor Co., Ltd.
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110-8534 JAPAN

[L780S05]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=10V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		4.8	5.0	5.2	V
	V_O2	7V≤V_{IN}≤20V, 5mA≤V_{IN}≤1A	4.75		5.25	V
Line regulation 1	$\Delta V_O LN1$	7V≤V_{IN}≤25V		3	100	mV
Line regulation 2	$\Delta V_O LN2$	8V≤V_{IN}≤12V		1	50	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			100	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			50	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	7V≤V_{IN}≤25V			1.3	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		40		μV
Ripple rejection	Rr	f=120Hz, 8V≤V_{IN}≤18V	62	78		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S08]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=15V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		7.7	8.0	8.3	V
	V_O2	10.5V≤V_{IN}≤23V, 5mA≤V_{IN}≤1A	7.6		8.4	V
Line regulation 1	$\Delta V_O LN1$	10.5V≤V_{IN}≤25V		6.0	160	mV
Line regulation 2	$\Delta V_O LN2$	11V≤V_{IN}≤17V		2.0	80	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			160	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			80	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	10.5V≤V_{IN}≤25V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		52		μV
Ripple rejection	Rr	f=120Hz, 11.5V≤V_{IN}≤21.5V	56	72		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S09]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=16V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		8.64	9.0	9.36	V
	V_O2	11.5V≤V_{IN}≤24V, 5mA≤V_{IN}≤1A	8.55		9.45	V
Line regulation 1	$\Delta V_O LN1$	11.5V≤V_{IN}≤25V		7	180	mV
Line regulation 2	$\Delta V_O LN2$	12V≤V_{IN}≤20V		2	90	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			180	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			90	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	11.5V≤V_{IN}≤26V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		57		μV
Ripple rejection	Rr	f=120Hz, 12V≤V_{IN}≤22V	56	72		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S10]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=17V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		9.6	10.0	10.4	V
	V_O2	12.5V≤V_{IN}≤25V, 5mA≤V_{IN}≤1A	9.5		10.5	V
Line regulation 1	$\Delta V_O LN1$	12.5V≤V_{IN}≤28V		8	200	mV
Line regulation 2	$\Delta V_O LN2$	14V≤V_{IN}≤20V		2.5	100	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			200	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			100	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	12.5V≤V_{IN}≤25V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		63		μV
Ripple rejection	Rr	f=120Hz, 13V≤V_{IN}≤23V	55	72		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S12]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=19V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		11.5	12.0	12.5	V
	V_O2	14.5V≤V_{IN}≤27V, 5mA≤V_{IN}≤1A	11.4		12.6	V
Line regulation 1	$\Delta V_O LN1$	14.5V≤V_{IN}≤30V		10	240	mV
Line regulation 2	$\Delta V_O LN2$	16V≤V_{IN}≤22V		3	120	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			240	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			120	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	14.5V≤V_{IN}≤30V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		75		μV
Ripple rejection	Rr	f=120Hz, 15V≤V_{IN}≤25V	55	71		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S15]

Recommended Operating Conditions at Ta=25°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 Tj=25°C, V_{IN}=23V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		14.4	15.0	15.6	V
	V_O2	17.5V≤V_{IN}≤30V, 5mA≤V_{IN}≤1A	14.25		15.75	V
Line regulation 1	$\Delta V_O LN1$	17.5V≤V_{IN}≤30V		11	300	mV
Line regulation 2	$\Delta V_O LN2$	20V≤V_{IN}≤26V		3	150	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			300	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			150	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC} LN$	17.5V≤V_{IN}≤30V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC} LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		90		μV
Ripple rejection	Rr	f=120Hz, 18.5V≤V_{IN}≤28.5V	54	70		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

[L780S18]

Recommended Operating Conditions at Ta=25°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

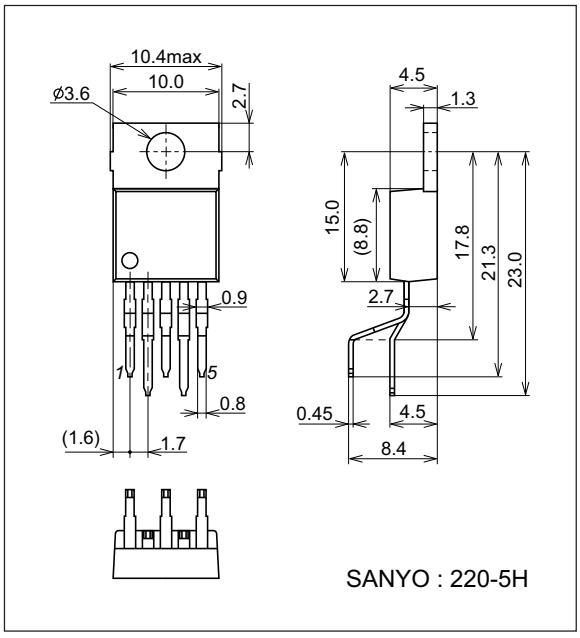
Operating Characteristics at Tj=25°C, V_{IN}=27V, I_O=500mA, Vst=0V, *Ta=25°C

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Output voltage	V_O1		17.3	18.0	18.7	V
	V_O2	21V≤V_{IN}≤33V, 5mA≤V_{IN}≤1A	17.1		18.9	V
Line regulation 1	$\Delta V_O LN1$	21V≤V_{IN}≤33V		15	360	mV
Line regulation 2	$\Delta V_O LN2$	24V≤V_{IN}≤30V		5	180	mV
Load regulation 1	$\Delta V_O LD1$	5mA≤I_O≤1.5A			360	mV
Load regulation 2	$\Delta V_O LD2$	250mA≤I_O≤750mA			180	mV
Current dissipation	I_{CC}				8.0	mA
Current dissipation variation (Line)	$\Delta I_{CC}LN$	21V≤V_{IN}≤33V			1.0	mA
Current dissipation variation (Load)	$\Delta I_{CC}LD$	5mA≤I_O≤1A			0.5	mA
Output noise voltage	V_{NO}	10Hz≤f≤100kHz*		110		μV
Ripple rejection	Rr	f=120Hz, 22V≤V_{IN}≤32V	53	69		dB
Dropout voltage	V_{drop}	I_O=1A		2.0		V
Output short current	I_{OS}	V_{IN}=35V		0.75		A
Peak output current	I_{OP}			2.2		A
Output voltage at strobe mode	V_O(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			0.8	V
Current dissipation at strobe mode	I_{CC}(ston)	V_{IN}=35V, Vst=5V, I_O=0A, *			3.0	mA
Strobe input current	Ist	V_{IN}=35V, Vst=5V, I_O=0A, *			1.0	mA

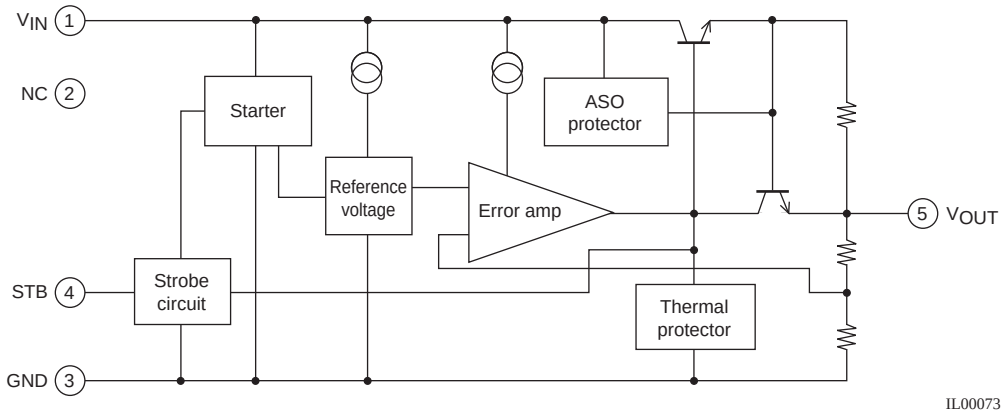
Package Dimensions

unit : mm

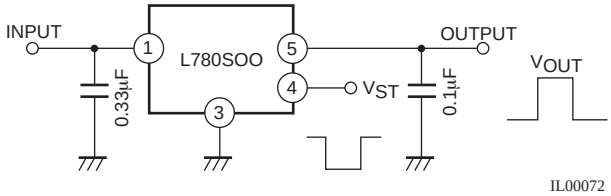
3079C

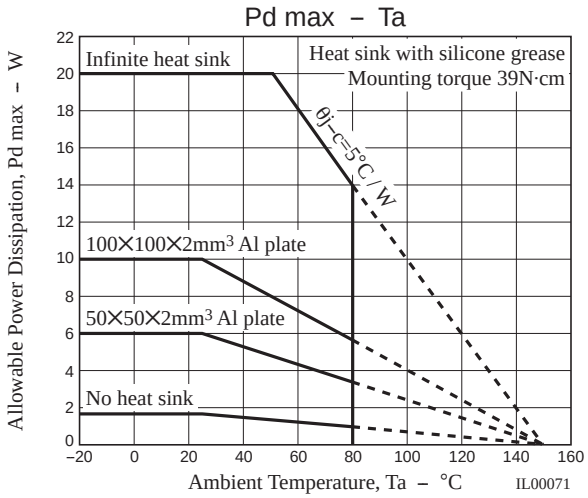


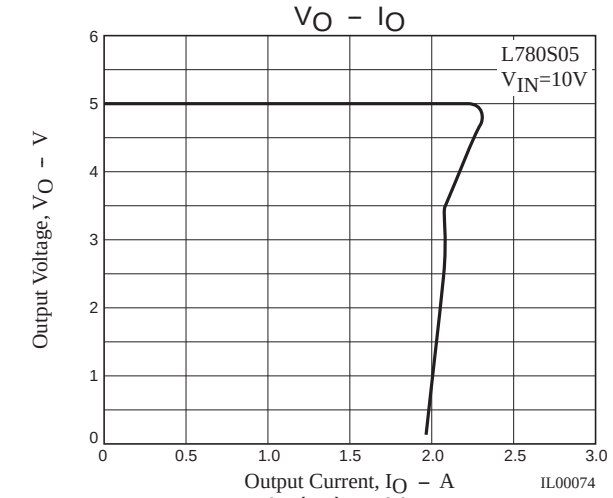
Equivalent Circuit Block Diagram

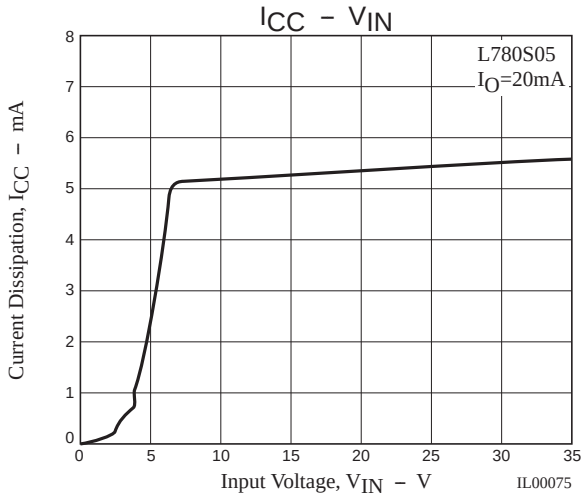


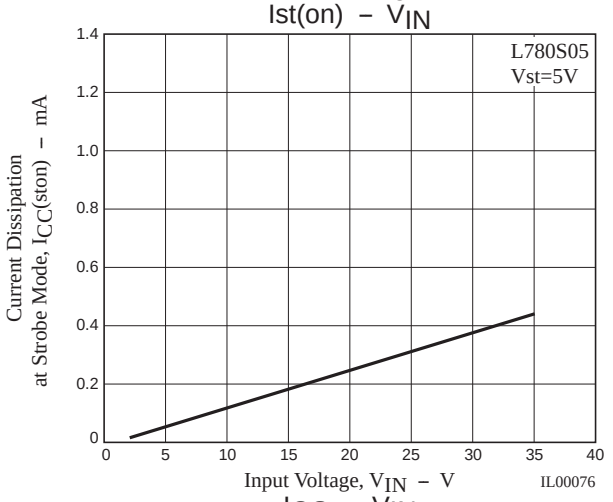
DC Characteristics Test Circuit (Common to L780S00 series)

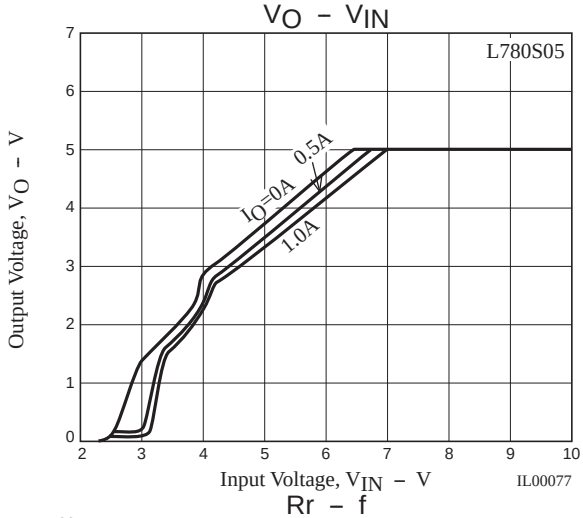


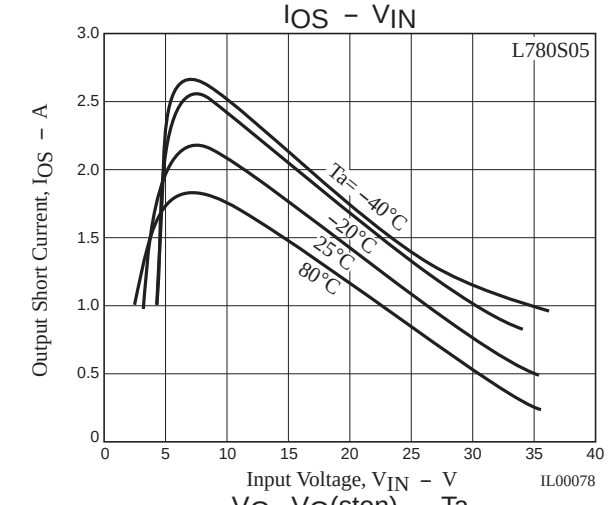


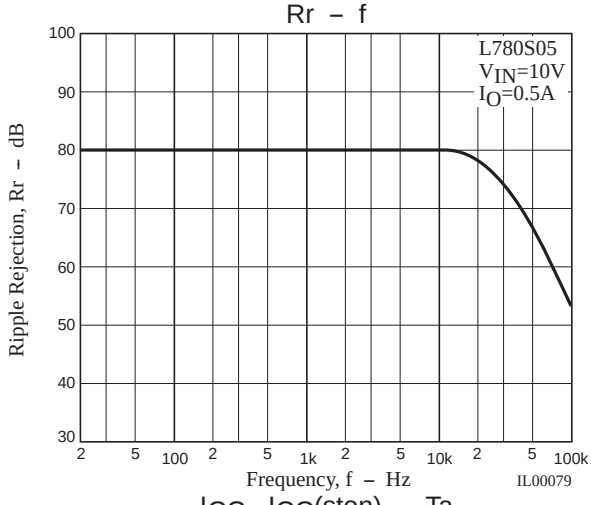

VO – IO
L780S05
VIN=10V
Output Voltage, VO – V
Output Current, IO – A
IL00074

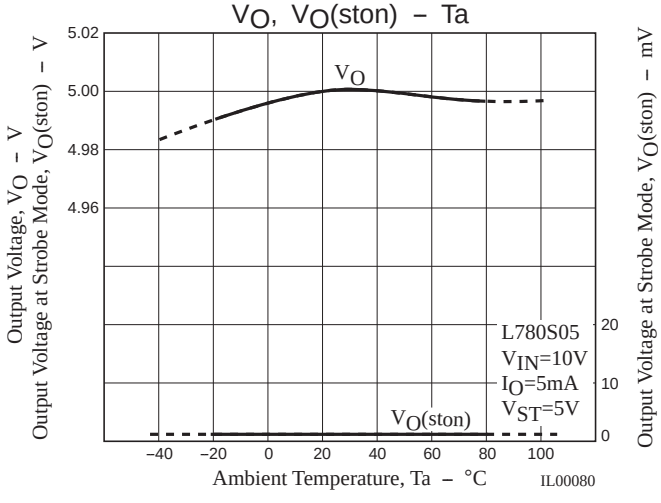

ICC – VIN
L780S05
IO=20mA
Current Dissipation, ICC – mA
Input Voltage, VIN – V
IL00075

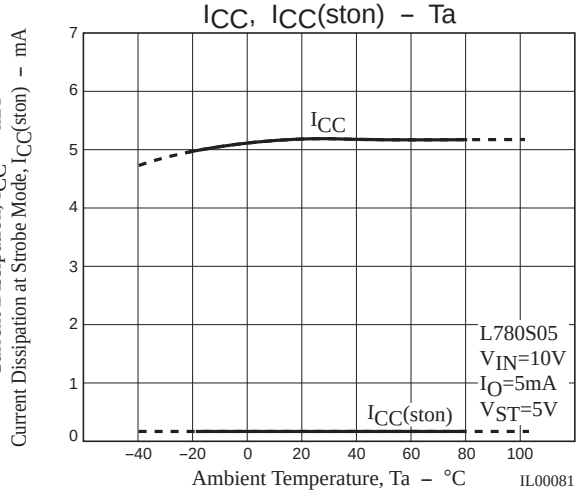

Ist(on) – VIN
L780S05
Vst=5V
Current Dissipation at Strobe Mode, ICC(ston) – mA
Input Voltage, VIN – V
IL00076


VO – VIN
L780S05
IO=0A
0.5A
1.0A
Output Voltage, VO – V
Input Voltage, VIN – V
IL00077


IOS – VIN
L780S05
Ta=–40°C
–20°C
25°C
80°C
Output Short Current, IOS – A
Input Voltage, VIN – V
IL00078


Rr – f
L780S05
VIN=10V
IO=0.5A
Ripple Rejection, Rr – dB
Frequency, f – Hz
IL00079


VO, VO(ston) – Ta
VO
VO(ston)
L780S05
VIN=10V
IO=5mA
VST=5V
Output Voltage, VO – V
Output Voltage at Strobe Mode, VO(ston) – V
Output Voltage at Strobe Mode, VO(ston) – mV
Ambient Temperature, Ta – °C
IL00080


ICC, ICC(ston) – Ta
ICC
ICC(ston)
L780S05
VIN=10V
IO=5mA
VST=5V
Current Dissipation, ICC – mA
Current Dissipation at Strobe Mode, ICC(ston) – mA
Ambient Temperature, Ta – °C
IL00081