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SPECIFICATION
78Mxx

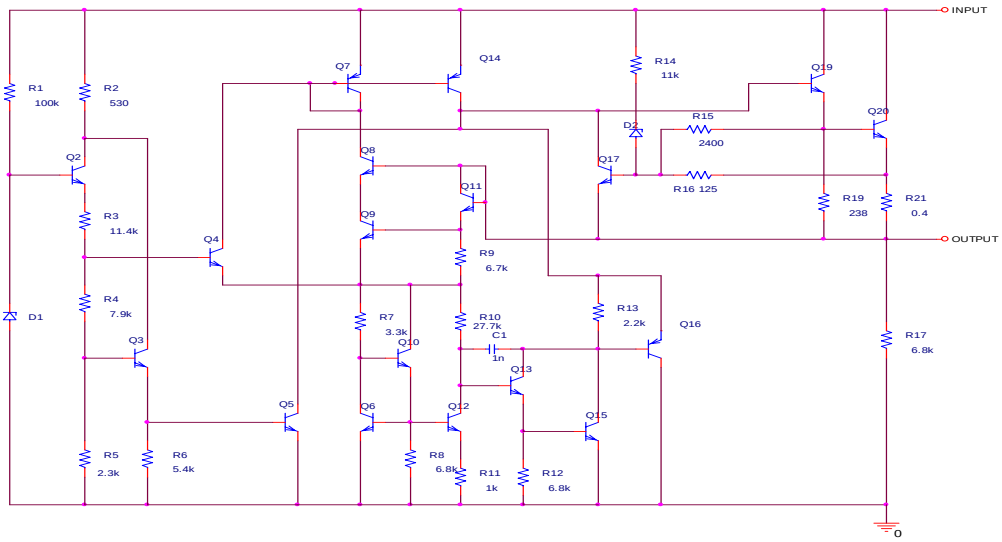
Three-Terminal Positive Voltage Regulators

1. Function

1.1. Features

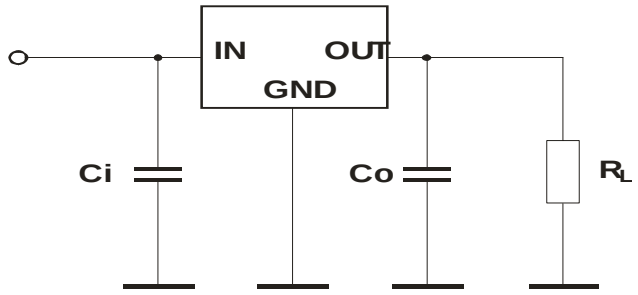
- Output Current in Excess of 0.5 A
- Internal Thermal Overload Protection
- Internal Short Circuit Current
- Output Transistor Safe-Area Compensation

1.2. Functional diagram Fig.1



1.3. Typical application circuit

Fig.2



Ci = 0.33μF, Co = 0.1

1.4. Device Type/Nominal Output Voltage

78M05	**5.0V**	**78M12**	**12V**
78M06	**6.0V**	**78M15**	**15V**

78M08	**8.0V**	**78M18**	**18V**
78M09	**9.0V**	**78M20**	**20V**
78M10	**10V**	**78M24**	**24V**

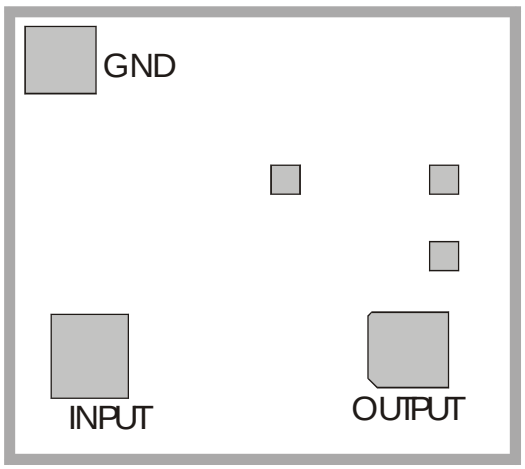
2. Product characteristics

2.1 Wafer physical characteristics

Wafer diameter – 100mm
Wafer thickness – 300±30μm
Die size – 1.58 x 1.4 mm
Scribe line width – 66μm
Passivation – PSG
Metallization bottom – Ti-Ni-Ag
Die quantity on the wafer – 3280

2.2. Pad bonding location circuit

Fig.3.



2.3. Bonding pad location

Pad name	Pad size (μm × μm)	Coordinates (μm)	
		X	Y
Input	241 x 262	261	313
Output	250 x 238	1245	343
Ground	221 x 211	160	1248

Note: Coordinates X and Y – center of a pad is relative to the left lower chip corner (the middle of scribing line).

3. Electrical characteristic and test condition requirements.

3.1 Operating temperature range - $0 \leq T_A \leq +125$ °C

3.2. Electrical characteristics @ $T_A = 25$°C

Table 2

SPECIFICATION
78Mxx

Parameter, units		Symbol	Test conditions	Limits		
				Min	Typ.	Max
Output Voltage, V	78M05	V_O	V_I=10V, I_O=350mA	4.8	5.0	5.2
	78M06		V_I=11V, I_O=350mA	5.75	6.0	6.25
	78M08		V_I=14V, I_O=350mA	7.7	8.0	8.3
	78M09		V_I=15V, I_O=350mA	8.64	9.0	9.36
	78M10		V_I=16V, I_O=350mA	9.6	10.0	10.4
	78M12		V_I=19V, I_O=350mA	11.5	12.0	12.5
	78M15		V_I=23V, I_O=350mA	14.4	15.0	15.6
	78M18		V_I=27V, I_O=350mA	17.3	18.0	18.7
	78M20		V_I=29V, I_O=350mA	19.2	20.0	20.8
	78M24		V_I=33V, I_O=350mA	23.0	24.0	25.0
Line Regulation, mV	78M05	Reg_{LINE}	V_I=7–25V, I_O=200mA		3	50
	78M06		V_I=8–25V, I_O=200mA		5	50
	78M08		V_I=10.5–25V, I_O=200mA		5	50
	78M09		V_I=11.5–25V, I_O=200mA		5	50
	78M10		V_I=12.5–26V, I_O=200mA		5	50
	78M12		V_I=14.5–27V, I_O=200mA		8	50
	78M15		V_I=17.5–30V, I_O=200mA		8	50
	78M18		V_I=21–33V, I_O=200mA		8	50
	78M20		V_I=23–35V, I_O=200mA		10	50
	78M24		V_I=27–38V, I_O=200mA		10	50
Load Regulation, mV	78M05	Reg_{LOAD}	V_I=10V, I_O=5mA–500mA V_I=10V, I_O=5mA–200mA		20 10	100 50
	78M06		V_I=11V, I_O=5mA–500mA V_I=11V, I_O=5mA–200mA		20 10	120 60
	78M08		V_I=14V, I_O=5mA–500mA V_I=14V, I_O=5mA–200mA		25 10	160 80
	78M09		V_I=15V, I_O=5mA–500mA V_I=15V, I_O=5mA–200mA		25 10	180 90
	78M10		V_I=16V, I_O=5mA–500mA V_I=16V, I_O=5mA–200mA		25 10	200 100
	78M12		V_I=19V, I_O=5mA–500mA V_I=19V, I_O=5mA–200mA		25 10	240 120
Load Regulation, mV	78M15	Reg_{LOAD}	V_I=23V, I_O=5mA–500mA V_I=23V, I_O=5mA–200mA		30 10	300 150
	78M18		V_I=27V, I_O=5mA–500mA V_I=27V, I_O=5mA–200mA		30 10	360 180
	78M20		V_I=29V, I_O=5mA–500mA V_I=29V, I_O=5mA–200mA		30 10	400 200
	78M24		V_I=33V, I_O=5mA–500mA V_I=33V, I_O=5mA–200mA		30 10	480 240

Parameter, units		Symbol	Test conditions	Limits		
				Min	Typ.	Max
Input Bias Current, mA	78M05	I_{IB}	V_I=10V, I_O=500mA		2.8	6.0
	78M06		V_I=11V, I_O=500mA		2.8	6.0
	78M08		V_I=14V, I_O=500mA		2.8	6.0
	78M09		V_I=15V, I_O=500mA		2.8	6.0
	78M10		V_I=16V, I_O=500mA		2.8	6.0
	78M12		V_I=19V, I_O=500mA		2.8	6.0
	78M15		V_I=23V, I_O=500mA		2.8	6.0
	78M18		V_I=27V, I_O=500mA		2.8	6.0
	78M20		V_I=29V, I_O=500mA		2.8	6.0
	78M24		V_I=33V, I_O=500mA		2.8	6.0
Quiescent Current Change, mA	78M05	ΔI_{IB}	V_I=7V–25V, I_O=200mA V_I=10V, I_O=5mA–350mA			0.8 0.5
	78M06		V_I=8V–25V, I_O=200mA V_I=11V, I_O=5mA–350mA			0.8 0.5
	78M08		V_I=10.5V–25V, I_O=200mA V_I=14V, I_O=5mA–350mA			0.8 0.5
	78M09		V_I=11.5V–26V, I_O=200mA V_I=15V, I_O=5mA–350mA			0.8 0.5
	78M10		V_I=12.5V–29V, I_O=200mA V_I=16V, I_O=5mA–350mA			0.8 0.5
	78M12		V_I=14.5V–30V, I_O=200mA V_I=19V, I_O=5mA–350mA			0.8 0.5
	78M15		V_I=17.5V–30V, I_O=200mA V_I=23V, I_O=5mA–350mA			0.8 0.5
	78M18		V_I=21V–33V, I_O=200mA V_I=27V, I_O=5mA–350mA			0.8 0.5
	78M20		V_I=23V–35V, I_O=200mA V_I=29V, I_O=5mA–350mA			0.8 0.5
	78M24		V_I=27V–38V, I_O=200mA V_I=33V, I_O=5mA–350mA			0.8 0.5
Dropout Voltage, V		$V_I - V_O$	I_O=500mA		2.0	
Short Circuit Current Limit, mA		I_{OS}	V_I=35V		100	
Peak Output Current, mA					1000	

3.3. Electrical characteristics @ 0°C ≤ T_A ≤ +125 °C.

Table 3

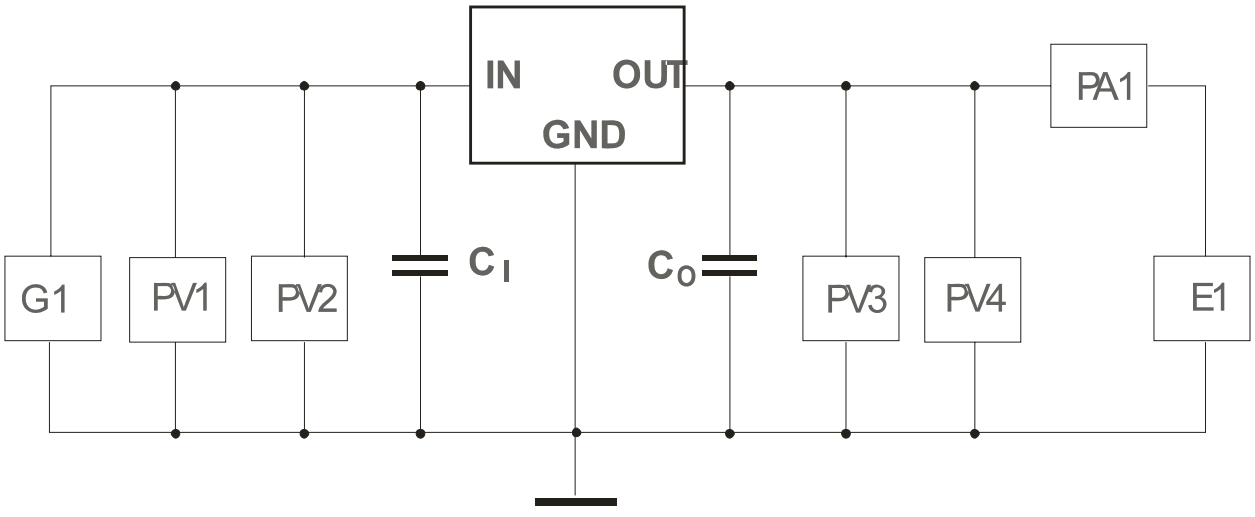
Parameter, units		Symbol	Test conditions	Limits		
				Min	Typ.	Max
Output Voltage, V	78M05	V_O	V_I=7–20V, I_O=5mA–350mA	4.75	5.0	5.25
	78M06		V_I=8–21V, I_O=5mA–350mA	5.7	6.0	6.3
	78M08		V_I=10.5–23V, I_O=5mA–350mA	7.6	8.0	8.4
	78M09		V_I=11.5–23V, I_O=5mA–350mA	8.55	9.0	9.45
	78M10		V_I=12.5–24V, I_O=5mA–350mA	9.5	10.0	10.5
	78M12		V_I=14.5–27V, I_O=5mA–350mA	11.4	12.0	12.6
	78M15		V_I=17.5–30V, I_O=5mA–350mA	14.25	15.0	15.75
	78M18		V_I=21–33V, I_O=5mA–350mA	17.1	18.0	18.9
	78M20		V_I=23–35V, I_O=5mA–350mA	19	20.0	21
	78M24		V_I=27–33V, I_O=5mA–350mA	22.8	24.0	25.2
Average Temperature Coefficient of Output Voltage, mV/°C		$\Delta V_O/\Delta T$	I_O=5mA		-0.2	

3.4. Absolute maximum ratings

Table 4

Parameter		Symbol	Value
Input Voltage, V	5.0V – 12V	V_I	35
	15V – 24V		40
Operating Junction Temperature Range, °C		T_J	+150
Storage Temperature Range, °C		T_{STG}	-65 to +150

4. Parameter measurement circuits



G1 –voltage source;
PV1, PV3 – DC voltmeter;

PV2, PV4 – DC Puls voltmeter;
PA1 – DC amperemeter;
E1 – load unit;
C_I = 0.1 μF ± 20%;
C_O = 1.0 μF ± 20%;

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5. Marking, packing, storage

5.1. Wafers have no marking. Device part number, lot number, good die quantity are written on the transport box label.

5.2. Failed dies are marked with ink dotes.

5.3. Wafers are packaged into consumer group transport box, with the label according to 5.1.

5.4. Wafer storage time:

a) when stored in manufacturer's packing in warm room – 12 months;

b) after taking out from manufacturer's packing– 10 days (under the conditions, which meet IC production requirements).