

Voltage and Current Control (dual op-amp and shunt regulator) (quad op-amp and shunt regulator) Monolithic IC MM1377, 1378

Outline

The MM1377 incorporates an op-amp with a dual low-input offset voltage and a shunt regulator; the MM1378 combines a quad low-input offset voltage op-amp and shunt regulator. They are appropriate for use in battery chargers, switching power supplies and other voltage and current control applications. Op-amps with low input offset voltage are particularly well-suited for handling current detection signals and other low-amplitude signals.

Features

Op-amp unit

- | | |
|------------------------------------|-----------------------|
| 1. Input offset voltage | 0.2mV typ. |
| 2. Input offset current | 5nA typ. |
| 3. Input bias current | 30nA typ. |
| 4. Common-mode input voltage range | 0~V _{CC} -1V |
| 5. Power supply current | 0.6mA typ. |

Shunt regulator unit

- | | |
|--|------------|
| 1. Reference voltage | 2.5V typ. |
| 2. Reference voltage fluctuation (-20~+80°C) | 5mV typ. |
| 3. Minimum cathode current | 0.4mA typ. |

Package

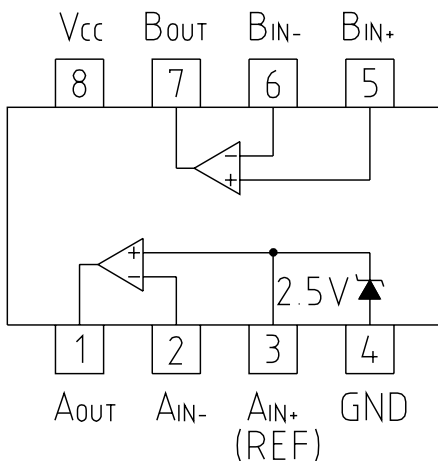
SOP-8C, SOP-8E (MM1377)
SOP-14B (MM1378)

Applications

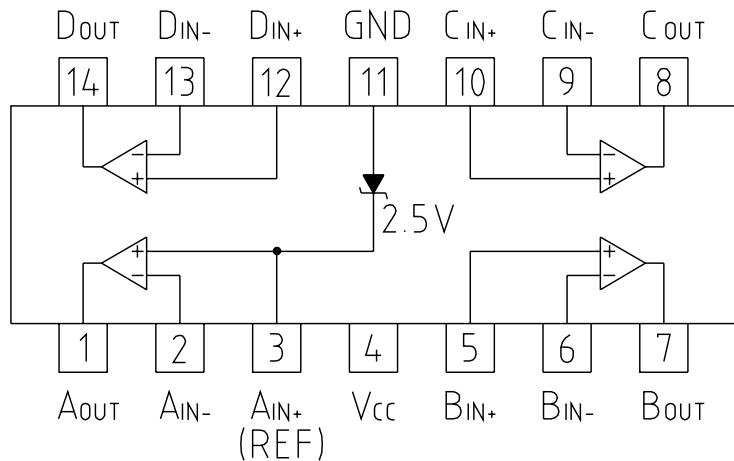
1. Charger
2. Switching power supply
3. AC adapter

Block Diagram

MM1377

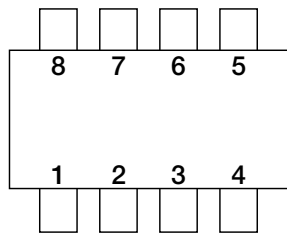


MM1378



Pin Assignment

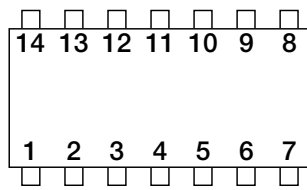
■ MM1377



SOP-8C, SOP-8E

1	A _{OUT}
2	A _{IN-}
3	A _{IN+} (REF)
4	GND
5	B _{IN+}
6	B _{IN-}
7	B _{OUT}
8	V _{CC}

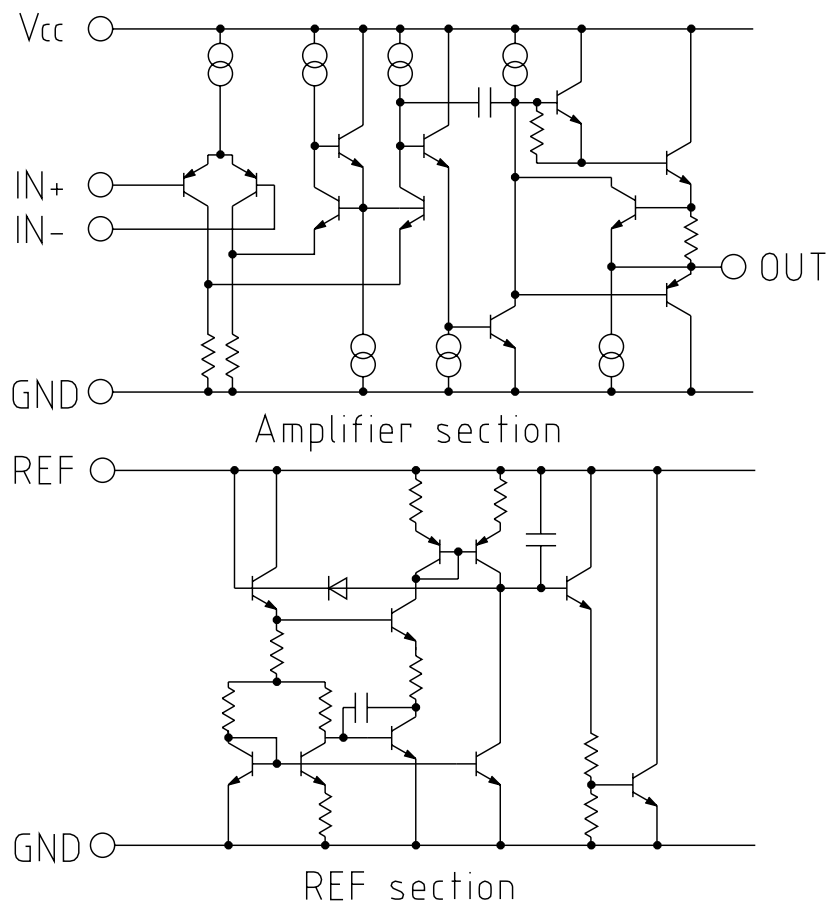
■ MM1378



SOP-14B

1	A _{OUT}	8	C _{OUT}
2	A _{IN-}	9	C _{IN-}
3	A _{IN+} (REF)	10	C _{IN+}
4	V _{CC}	11	GND
5	B _{IN+}	12	D _{IN+}
6	B _{IN-}	13	D _{IN-}
7	B _{OUT}	14	D _{OUT}

Equivalent Circuit Diagram



Absolute Maximum Ratings

Item	Symbol	Ratings	Units
Storage temperature	T _{STG}	-40~+125	°C
Operating temperature	T _{OPR}	-20~+85	°C
Power supply voltage	V _{CC max.}	-0.3~+24	V
Allowable loss	P _D	300 (MM1377) 350 (MM1378)	mW

Recommended Operating Conditions

Item	Symbol	Ratings	Units
Operating temperature	T _{OPR}	-15~+80	°C
Operating voltage	V _{OPR}	+2~+20 *	V

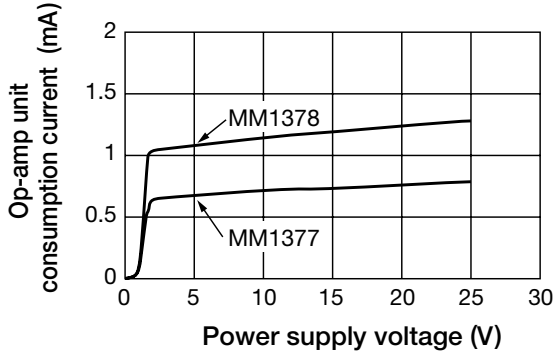
*Minimum value of operating voltage is for amp unit only

Electrical Characteristics (Except where noted otherwise, V_{CC}=5V, T_a=25°C)

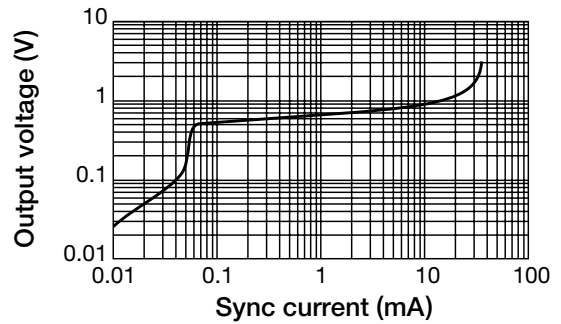
Item	Symbol	Measurement conditions	Min.	Typ.	Max.	Units
Op-amp unit						
Input offset voltage	V _{IO}			0.2	0.9	mV
Input offset current	I _{IO}	Excluding amp A		5	50	nA
Input bias current	I _B			30	150	nA
Common-mode input voltage range	V _I	Excluding amp A	0		V _{CC} -1	V
Power supply current	I _{CC}	R _L =∞, for two circuits	MM1377	0.6	1.0	mA
		R _L =∞, for four circuits	MM1378	1.2	2.0	
Voltage gain	A _V			100		dB
Output voltage L	V _{OL}	R _L =∞		10	100	mV
Output voltage H	V _{OH}	R _L =∞	V _{CC} -1.1	V _{CC} -0.8		V
Common-mode signal rejection ratio	CMRR		65	85		dB
Power supply voltage rejection ratio	PSRR		65	100		dB
Output outflow current	I _{SO}		20	35		mA
Output inflow current	I _{SI}		10	20		mA
Shunt regulator						
Reference voltage	V _{REF}		2.450	2.500	2.550	V
Reference voltage fluctuation within operating temperature range	ΔV _{REF}			5	17	mV
Minimum cathode current	I min.			0.4	1.0	mA
Dynamic impedance	Z _{KA}			0.4	0.7	Ω

Characteristics

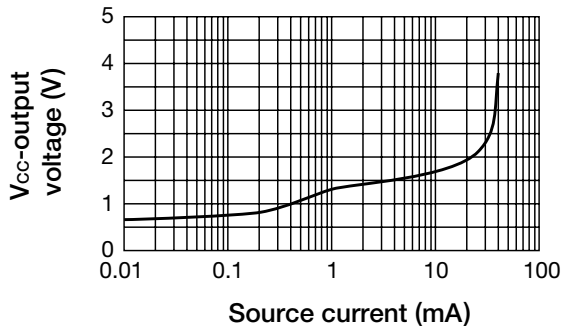
■ Consumption current vs power supply voltage (Ta=25°C)



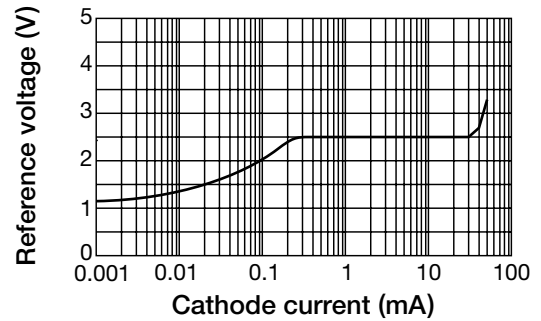
■ Output voltage vs sync current (Ta=25°C)



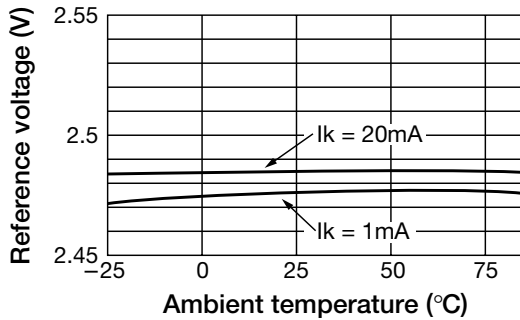
■ (V_{CC}-output voltage) vs source current (Ta=25°C)



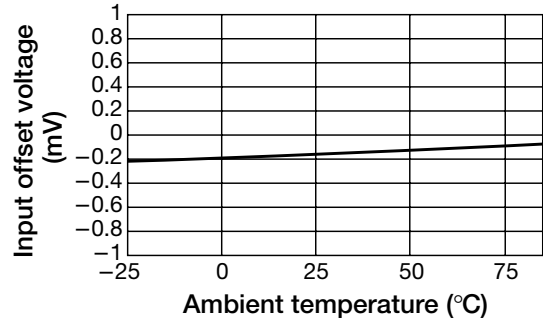
■ Reference voltage vs cathode current (Ta=25°C)



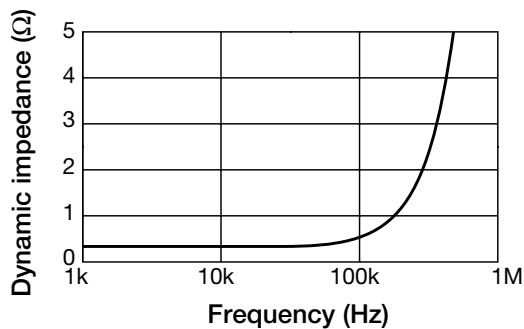
■ Reference voltage vs Ambient temperature



■ Input offset voltage vs Ambient temperature



■ Dynamic impedance vs frequency (Ta=25°C)



■ Voltage gain vs frequency (Ta=25°C)

