Application

Operational amplifier IC (for secondary control)

MM1837 Series

Overview

This IC is equipped with two operational amplifier circuits and a shunt regulator (2.5V) function. It can be used as the secondary control of the AC adapter. It can also be used as part of the application circuit of our IC MM3460 for LED lighting.

Features

- Input offset voltage ± 0.9mV Max.
- Shunt regulator reference voltage 2.5V
- Moisture-proof packaging

Applications

- Li-ion battery charger
- AC adapter
- Reference voltage source

Package

- SOP-8C

Main specifications

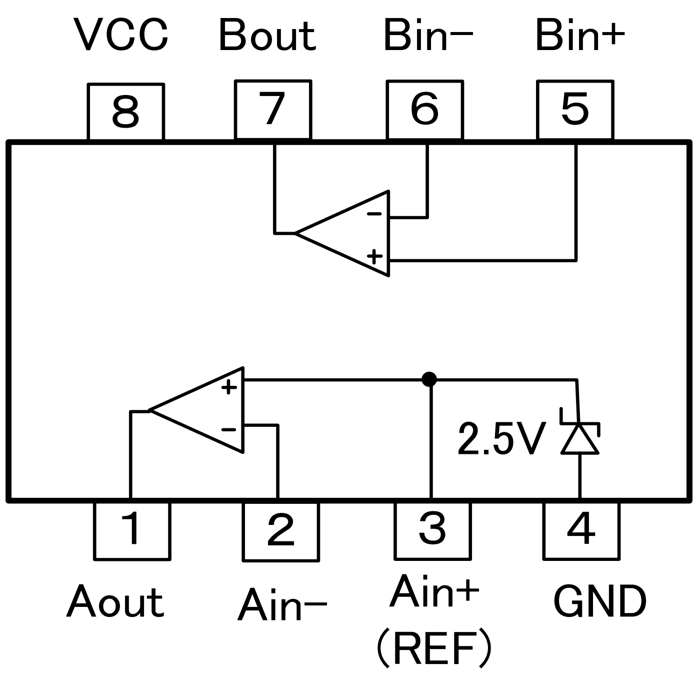
Op amp

Input offset voltage	:	Typ.0.2mV, Max0.9mV
Input bias current	:	30nA
Power supply current	:	0.6mA
Voltage gain	:	100dB
Common-mode rejection ratio	:	85dB
Power supply voltage removal ratic	:	100dB
Output outflow current	:	35mA
Output inflow current	:	20mA

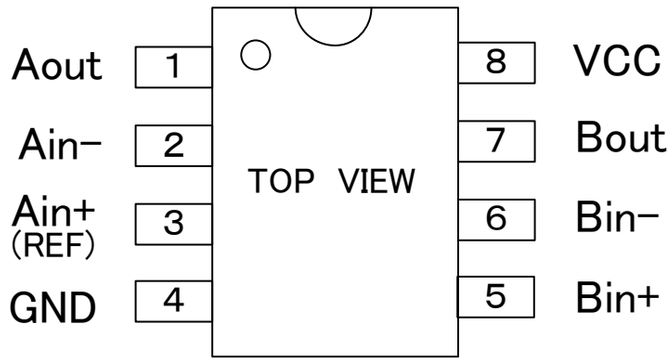
Shunt regulator

Reference voltage	:	2.5V
Minimum cathode current	:	0.4mA
Dynamic impedance	:	0.4Ω

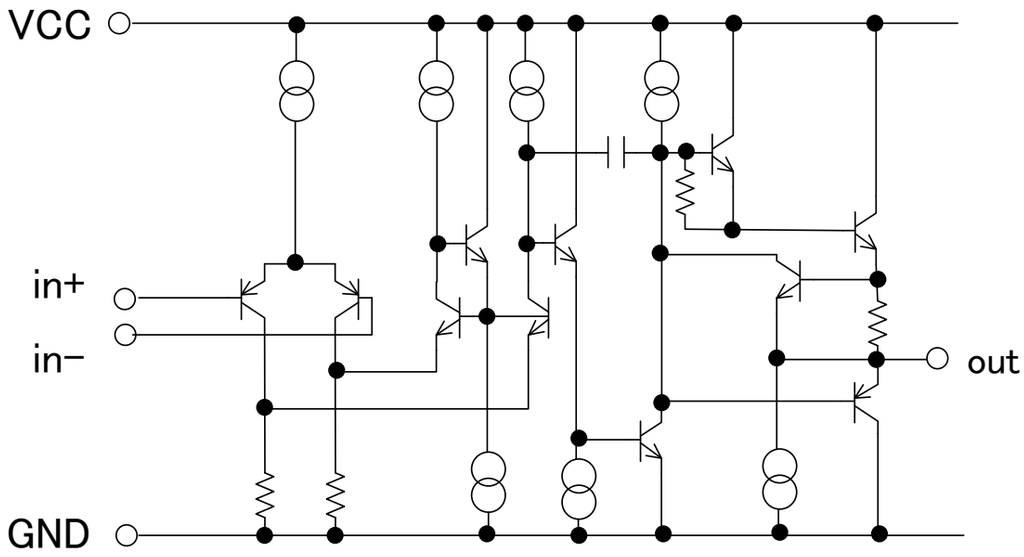
BLOCK DIAGRAM



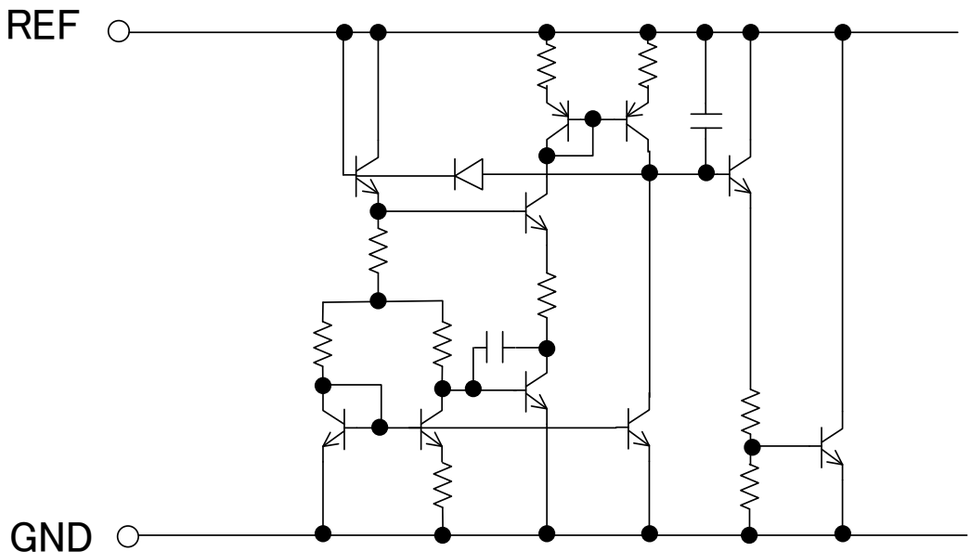
PIN CONFIGURATIONS



EQUIVALENT CIRCUIT DIAGRAM



Amplifier section



REF section

ABSOLUTE MAXIMUM RATINGS

(Ta=25℃, unless otherwise specified)

ITEM	SYMBOL	MIN.	MAX.	UNIT
Storage temperature	Tstg	-40	125	℃
Operating temperature	TOPR	-40	105	℃
Supply voltage	VCCMAX	-0.3	24	V
Power Dissipation	Pd	-	300	mW

RECOMMENDED OPERATING CONDITIONS

ITEM	SYMBOL	MIN.	MAX.	UNIT
Operating temperature	TOPR	-35	80	℃
Operating voltage	VOPR	2*1	20	V

*1
Minimum operating voltage is the value of the amplifier only.

ELECTRICAL CHARACTERISTICS

(Ta=25℃, VCC=5V, unless otherwise specified)

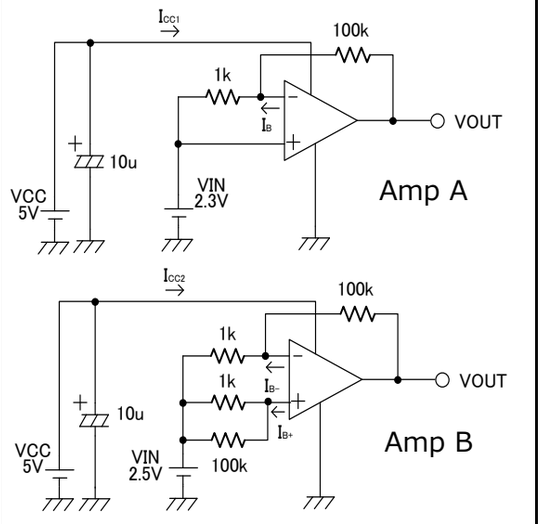
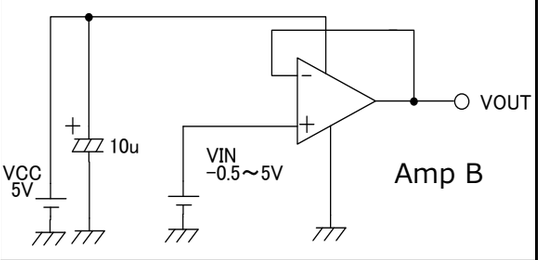
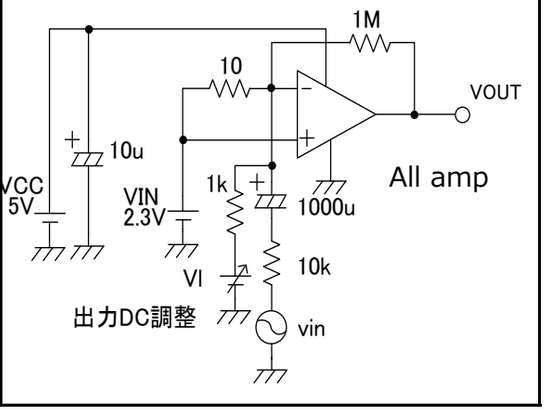
PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Op-amp unit						
Input offset voltage	VIO		-	0.2	0.9	mV
Input offset current	IIO	Excluding amp A	-	5	50	nA
Input bias current	IB		-	30	150	nA
Common-mode input voltage range	VI	Excluding amp A	0	-	VCC-1	V
Power supply current	ICC	RL=∞, for two circuits	-	0.6	1	mA
Voltage gain	Av		-	100	-	dB
Output voltage L	VOL	RL=∞	-	10	100	mV
Output voltage H	VOH	RL=∞	VCC-1.1	VCC-0.8	-	V

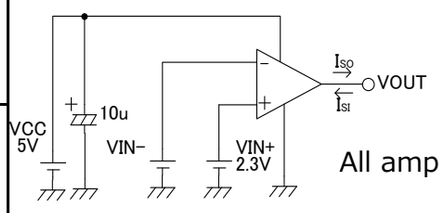
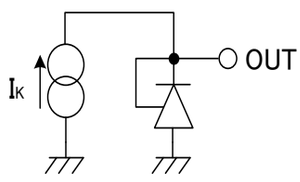
(Ta=25℃, VCC=5V, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Op-amp unit						
Common-mode signal rejection ratio	CMRR		65	85	-	dB
Power supply voltage rejection ratio	PSRR		65	100	-	dB
Output outflow current	ISO		20	35	-	mA
Output inflow current	ISI		10	20	-	mA
Shunt regulator						
Reference voltage	VREF		2.450	2.500	2.550	V
Reference voltage fluctustion within operating temoerature range	⊿VREF		-	5	17	mV
Minimum cathoge current	IMIN		-	0.4	1.0	mA
Dynamic impedance	|ZKA|		-	0.4	0.7	Ω

TEST CIRCUITS

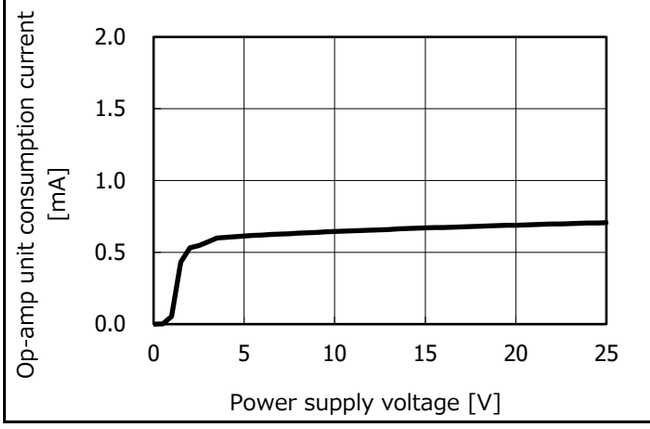
(Unless otherwise specified, the input conditions are subject to test circuit.)

PARAMETER	TEST CONDITIONS	TEST CIRCUITS
Op-amp unit		
Input offset voltage	VIO = |VOUT - VIN| / 100	
Input offset current	IIO = |IB+ - IB-|	
Input bias current	IB = |IB-| :Amp A IB = |IB+ + IB-| / 2 :Amp B	
Power supply current	ICC = ICC1 + ICC2	
Common-mode signal rejection ratio	VIN1: VIN = 2V, VIN2: VIN = 3V Each input and output are VOUT1, VOUT2. $CMRR = 20\log\left\lvert\frac{VIN2 - VIN1}{(VOUT2 - VIN2) - (VOUT1 - VIN2)}\right\rvert + 40$	
Power supply voltage rejection ratio	VCC1: VCC = 5V, VCC 2: VCC = 20V Each input and output are VIN1, VOUT1, VIN2, VOUT2. $PSRR = 20\log\left\lvert\frac{VCC2 - VCC1}{(VOUT2 - VIN2) - (VOUT1 - VIN1)}\right\rvert + 40$	
Common-mode input voltage range	Sweep Vin from -0.5V to 5V, and judge by VOUT .(Judge whether the output voltage is reversed, at low level.)	
Voltage gain	Adjust the DC voltage of output to 2V at V1. $Av = 20\log\lvert vout/vin\rvert + 60$	

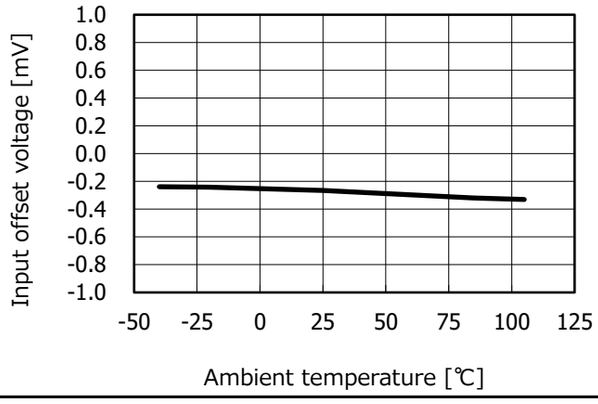
PARAMETER	TEST CONDITIONS	TEST CIRCUITS
Output voltage L	Measure VOUT when VIN- = 5V.	 All amp
Output voltage H	Measure VOUT when VIN- = 0V.	
Output outflow current	VIN- = 0V and VOUT = 2V are fixed. Measure ISO.	
Output inflow current	VIN- = 5V and VOUT = 2V are fixed. Measure ISI.	
Shunt regulator		
Reference voltage	Measure the voltage of OUT pin when IK = 1mA.	
Minimum cathoge current	Measure the current of IK when the voltage of OUT pin exceeds 2.45V while gradually increasing the current from IK = 0mA.	
Reference voltage fluctustion within operating temoerature range	In reference voltage above-mentioned, operating temoerature range is from -10℃ to 85℃.	
Dynamic impedance	voltage of OUT pin is VR1 when IK=1mA, and voltage of OUT pin is VR2 when IK2=10mA. |ZKA|=|VR2-VR1| / (IK2-IK1)	

TYPICAL PERFORMANCE CHARACTERISTICS

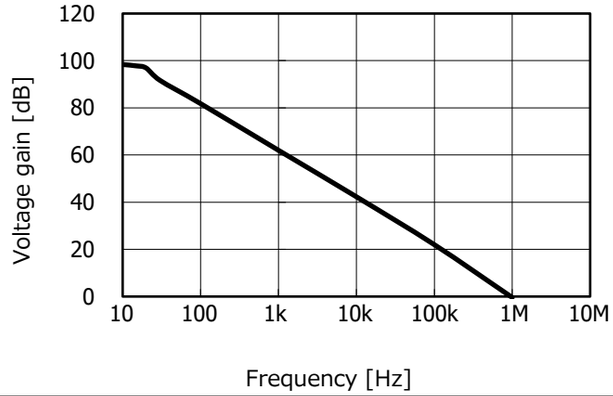
Consumption current vs power supply voltage (Ta=25℃)



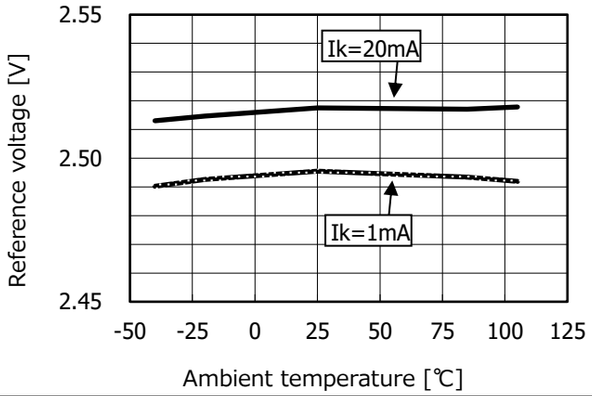
Input offset voltage vs Ambient temperature



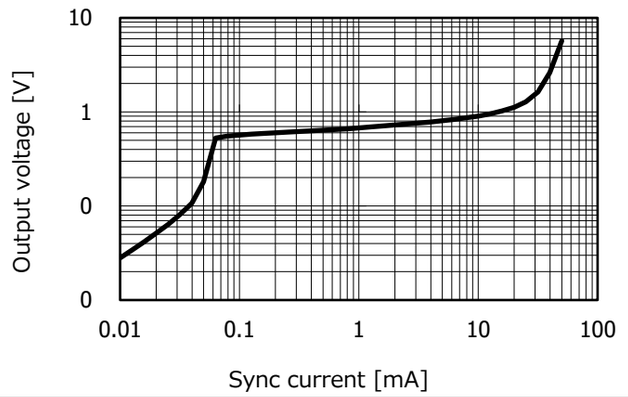
Voltage gain vs frequency (Ta=25°C)



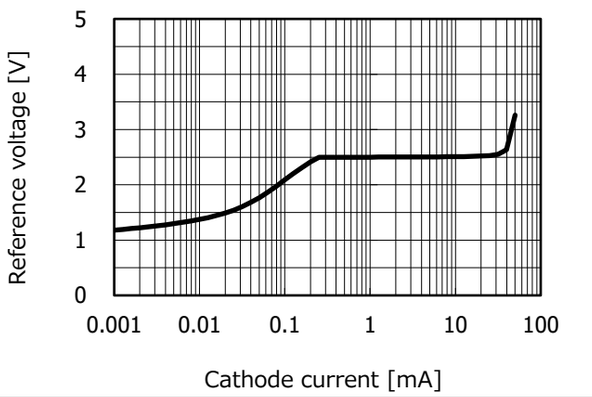
Reference voltage vs Ambient temperature

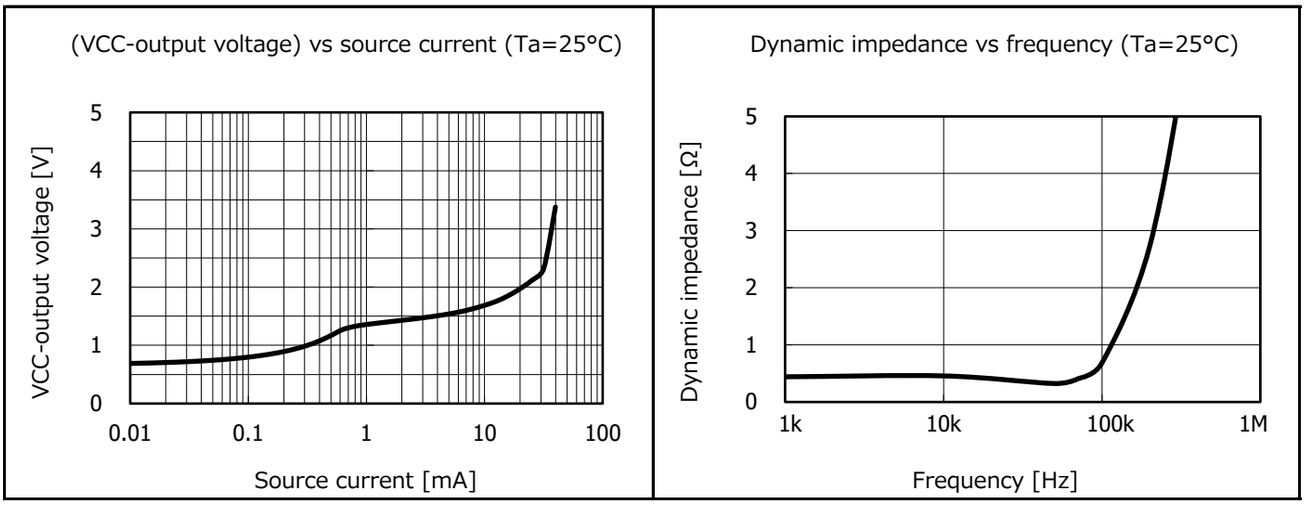


Output voltage vs sync current (Ta=25°C)



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

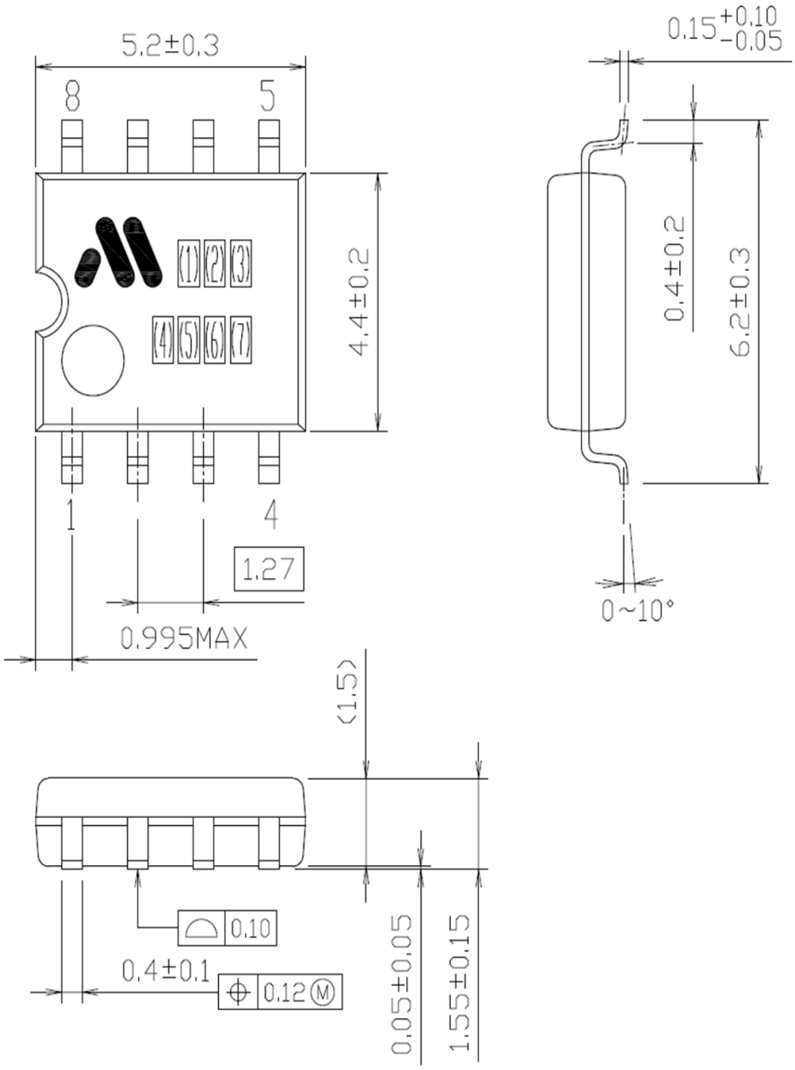



(VCC-output voltage) vs source current (Ta=25°C)
VCC-output voltage [V]
5
4
3
2
1
0
0.01
0.1
1
10
100
Source current [mA]
Dynamic impedance vs frequency (Ta=25°C)
Dynamic impedance [Ω]
5
4
3
2
1
0
1k
10k
100k
1M
Frequency [Hz]

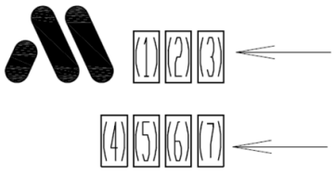
DIMENSIONS

PACKAGE : SOP-8C

UNIT	mm



MARKING CONTENTS



Date Code (1) :Production Year Code

Model name	Model No.			
	(4)	(5)	(6)	(7)
M M 1 8 3 7 X F B Y	1	8	3	7