MAS9128A

LDO Voltage Regulator IC

- **Three low dropout voltage regulators**
- **Regulator enable/disable control**
- **Power saving sleep mode**
- **Thermal protection**

DESCRIPTION

The MAS9128A is voltage regulator IC with three 2.85V LDO regulators providing voltage regulation for the handset terminal. The output voltages of the three regulators can be modified through a mask option. Two enable/disable pins control the state of the regulators. In order to save power the device goes into sleep mode when all regulators are disabled. An internal thermal protection circuit prevents the device from overheating. The maximum output current is limited internally.

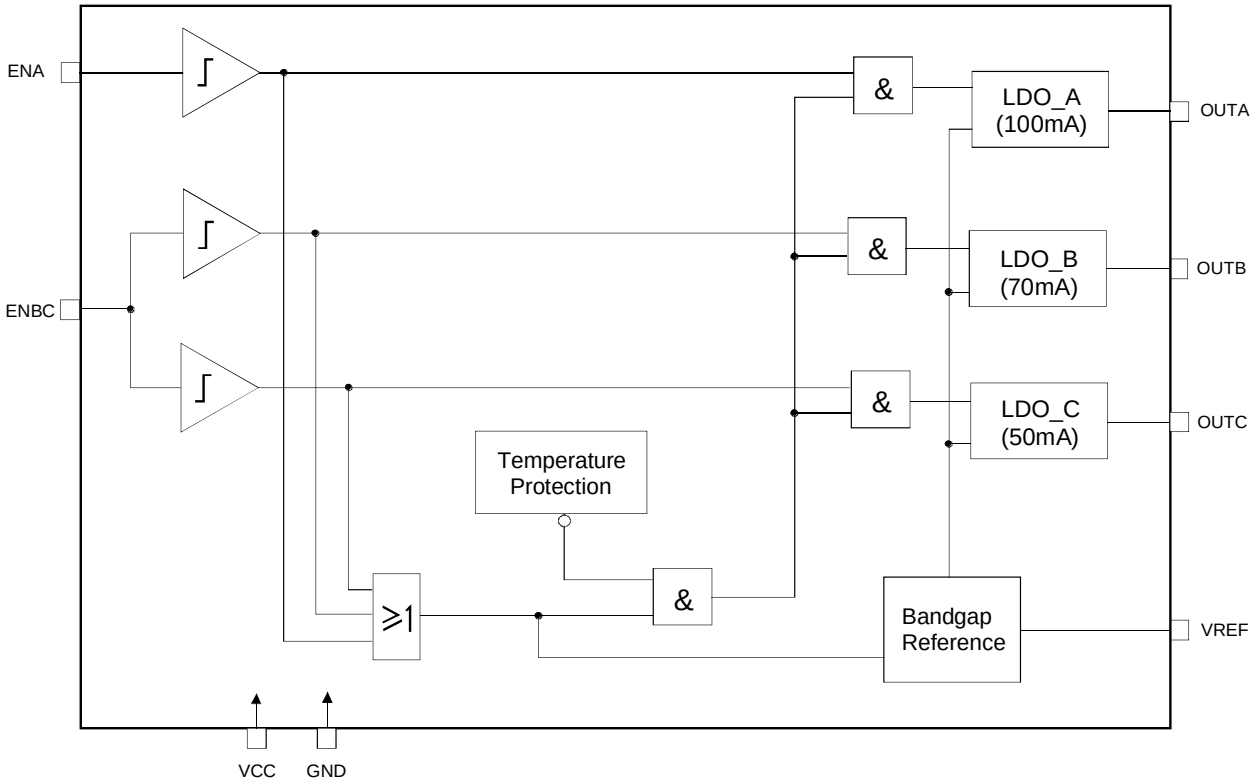
FEATURES

- 2.85V regulators at 100mA, 70mA and 50mA
- Output accuracy <±3%
- Fast dynamic response
- Low output noise
- Low supply current: 150µA per regulator
- SO8 package

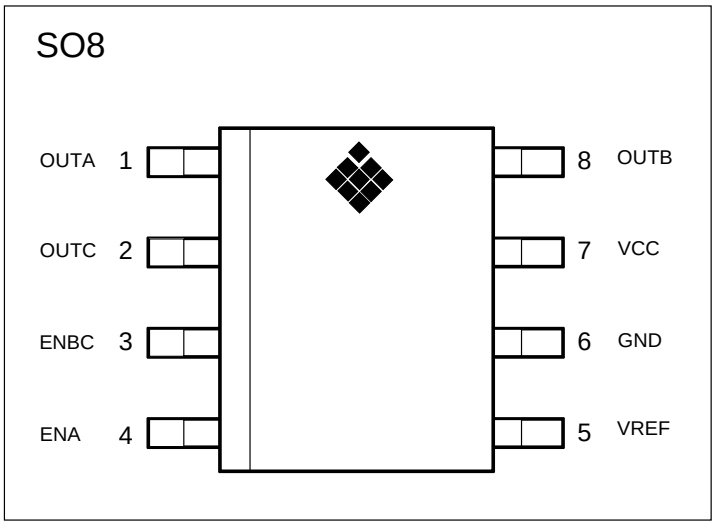
APPLICATION

- Mobile phones
- Cordless phones
- Battery powered systems

BLOCK DIAGRAM



PIN CONFIGURATION



PIN DESCRIPTION

Pin Name	Pin	Type	Function
OUTA	1	O	2.85V/100mA regulator output
OUTC	2	O	2.85V/50mA regulator output
ENBC	3	I	Enable for regulators B and C
ENA	4	I	Enable for regulator A
VREF	5	O	Reference voltage
GND	6	P	Ground
VCC	7	P	Positive supply voltage
OUTA	8	O	2.85V/70mA regulator output

ABSOLUTE MAXIMUM RATINGS

(All voltages with respect to ground.)

Parameter	Symbol	Conditions	Min	Max	Unit
Supply Voltage	V_{CC}		-0.3	13.0	V
Logic input voltage	V_{EN}		-0.3	V_{CC}+0.3	
Max. Junction Temperature	T_J			150	^{0}C
Thermal resistance	R_{JA}			163	^{0}C/W
Lead temperature		for 10 seconds		230	^{0}C
Storage Temperature	T_S		-55	+150	^{0}C
ESD Rating					

Note 1: Stresses beyond those listed may cause permanent damage to the device. The device may not operate under these conditions, but will not be destroyed.

RECOMMENDED OPERATION CONDITIONS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	V_{CC}		3.1		6.5	V
Operating Temperature	T_{AMB}		-20		+70	^{0}C

ELECTRICAL CHARACTERISTICS

◆ Thermal protection

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Threshold high	T_H		130	150	170	^{0}C
Threshold low	T_L		120	140	160	^{0}C
Continuos power dissipation in operation						
		T_{AMB} = 25^{0}C			644	mW
		T_{AMB} = 70^{0}C			368	mW

NOTE 2:A hysteresis of 10^{0}C avoids oscillation in case of thermal shutdown. After the regulator temperature has dropped by this value, it will turn on again automatically.

◆ Digital Inputs (ENA, ENBC)

(T_{AMB} = -20^{0}C to +70^{0}C, unless otherwise noted. Typical value for T_J is 27^{0}C.)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Input high voltage	V_{IH}		2.2			V
Input low voltage	V_{IL}				0.40	V

ELECTRICAL CHARACTERISTICS

◆ Regulator Outputs (LDO_A, LDO_B, LDO_C)

(T_{AMB} = -20°C to +70°C, unless otherwise noted. Typical value for Tj is 27°C Cin=1µF Cout= 1µF,ceramic)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Output voltage	V_{OUT}	3.1V < V_{CC} < 6.5V, 0mA < I_{OUT} < I_{MAX}	2.7	2.85	3.0	V
Short circuit current						
LDO_A	I_{MAXA}			310		mA
LDO_B	I_{MAXB}			220		mA
LDO_C	I_{MAXC}			170		mA
Load Current						
LDO_A	I_{OUTA}		0		100	mA
LDO_B	I_{OUTB}		0		70	mA
LDO_C	I_{OUTC}		0		50	mA
Line regulation		1Vpp at V_{CC}, max. load		1.1	10	mV
Load regulation		0mA < I_{OUT} < I_{MAX}				
LDO_A				9	45	mV
LDO_B				6	31	mV
LDO_C				5	22	mV
Load transient		T_{AMB} = 25°C				
		10uA to ½ load in 1us (4)		-60		mV
		100uA to max. Load in 1us (4)		-70		mV
		10uA to max. Load in 1us (5)		-85		mV
PSRR		f ≤ 10kHz, 1Vpp at V_{CC} = 4.5V CREF = 10nF	50	60		dB
Quiescent current per regulator		(3)				
	I_{QR}	ON, max. load		170		uA
	I_{QR}	ON, I_{OUT} = 100uA		150		uA
	I_{QR}	OFF		<1		uA
Total quiescent current	I_Q	ENA = ENBC = 0V I_{OUT} = 0 V_{CC} = 6.5V		<1	30	µA
Noise						
		10Hz < f < 100kHz typical load, no capacitor at VREF		190		uVrms
		10Hz < f < 100kHz typical load, 10nF cap. at VREF		50		uVrms
Settling time		Enables OFF to ON 2.7V < V_{OUT} < 3.0V 10nF cap. at VREF		0.5	1.0	ms
Output capacitor						
	C_{OUT}		0.8	1.0	2.6	uF
	ESR		0.01	0.1	1	Ohm

NOTE 3:To get the real quiescent current of the device, the quiescent current of the reference voltage generator (140uA typ.) has to be added together once for all regulators.
NOTE 4:V_{OUT} does not drop below 2.7V for more than 1us.
NOTE 5:V_{OUT} does not drop below 2.5V for more than 1us or below 2.7V for more than 50us.

FUNCTIONS

-

◆ **Supply Voltage, Voltage Regulators**

The device is supplied with 3.1V to 6.5V battery voltage under normal conditions. An internal band gap voltage reference is used to generate the reference voltage for all three voltage regulators. The reference voltage is routed via an internal 20kOhm Resistor to an external pin where a filter capacitor can be connected in order to reduce the noise level of all three regulators. The startup time of the reference voltage is then determined by the value of the bypass capacitor at pin VREF.

◆ **Enable Pins**

Each regulator can be enabled/disabled by the two enable pins ENA and ENBC. Pin ENA controls regulator LDO_A and pin ENBC controls both regulators LDO_B and LDO_C. If both enable pins are forced low, the internal voltage reference and internal bias source are turned off in order to save power. A common enable for all three regulator outputs is designed, but connected to VDD internally for the SOIC8 version of MAS9128A.

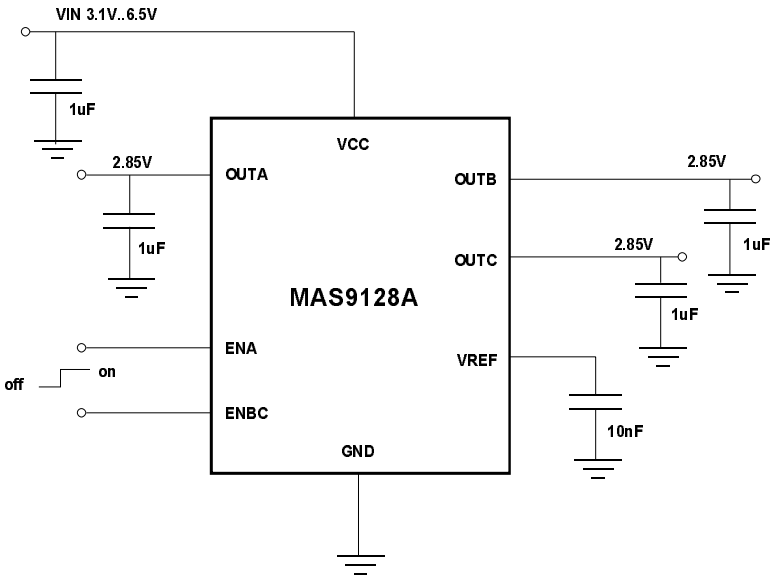
◆ **Regulators**

The device contains three 2.85V low dropout CMOS regulators with maximum output currents of 100mA, 70mA and 50mA. There is a mask option to modify the output voltage to 2.55V, 2.70V, 2.85V, 3.00V or 3.15V. The IC has thermal protection in order to prevent thermal destruction especially at high ambient temperatures. Maximum output current of each regulator is limited by an internal circuitry. The regulation loop of the regulators is optimized to work with low ESR ceramic buffer capacitors at the output.

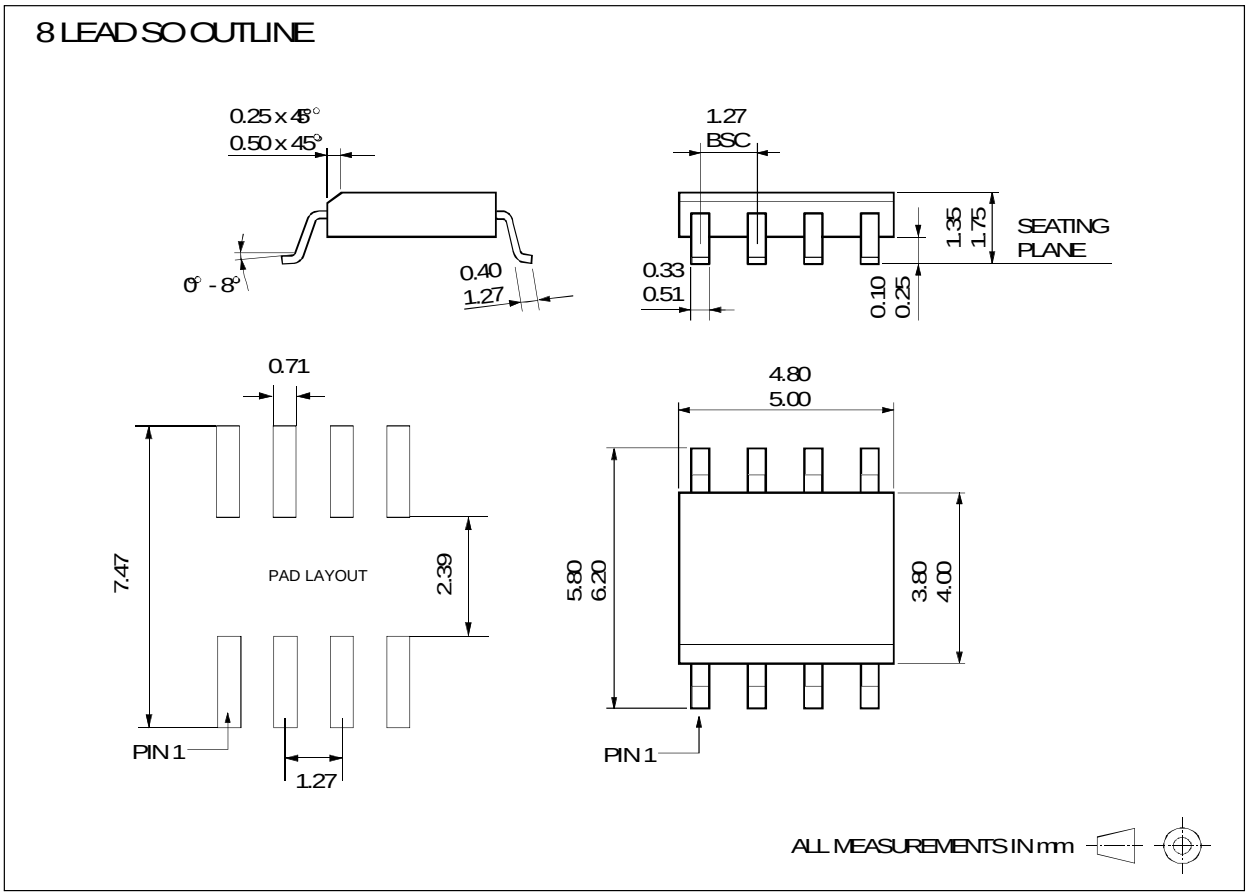
Logic table for Enable inputs

ENA	ENBC	LDO_A	LDO_B	LDO_C	VREF
1	1	ON	ON	ON	ON
1	0	ON	OFF	OFF	ON
0	1	OFF	ON	ON	ON
0	0	OFF	OFF	OFF	OFF

APPLICATION INFORMATION



PACKAGE OUTLINES AND RECOMMENDED LAND PATTERN



ORDERING INFORMATION

		k	
MAS9128AS	LDO Voltage Regulator IC	SO8	
MAS9128AS-T	LDO Voltage Regulator IC	SO8	Tape and Reel

LOCAL DISTRIBUTOR

MICRONAS CONTACTS

Micronas Semiconductor GmbH Lohweg 29 D-85375 NEUFAHRN, GERMANY	Tel. (08165) 9521 0 Tel. Int. + 49 8165 9521 0 Telefax + 49 8165 9521 99

Micronas Semiconductor SA Ch. Chapons-des-Prés CH-2022 BEVAIX, SWITZERLAND	tel. (032) 847 0111 Tel. Int. +41 32 847 0111 Telefax +41 32 846 1930

Micronas Oy Kamreerintie 2, P.O.Box 51 FIN-02771 ESPOO, FINLAND	Tel. (09) 80521 Tel. Int. +358 9 80521 Telefax +358 9 8053213

End of Data Sheet

MICRONAS
INTERMETALL

Back to Data Sheets