STRUCTURE Silicon Monolithic Integrated Circuit

PRODUCT NAME System Power Supply with MUTE Function

TYPE **BA4915-V11**

FEATURES
- Very low standby current
- MUTE SYSTEM, RESET with Output delay for microcontrollor, +B/ACC Voltage detection

○ABSOLUTE MAXIMUM RATINGS(Ta=25℃)

Parameter	Symbol	Limits	Unit
Supply Voltage	+B/ACC	30	V
Power Dissipation	Pd	3400	mW
Operating Temperature Range	Topr	-40～85	℃
Storage Temperature Range	Tstg	-55～150	℃
Peak Supply Voltage	+B/ACC peak	50(*1)	V

(*1) tr≧1msec Bias voltage less than 200msec

○RECOMMENDED OPERATING CONDITIONS(Ta=25℃)

Parameter	Symbol	Limits			Unit	Comment
		Min.	Typ.	Max.		
Recommend Supply Voltage Range1	+B	6.6	13.2	18	V	VDD output
Recommend Supply Voltage Range2	+B	9.6	13.2	18	V	COM, ANT+B, AMP+B output
Recommend Supply Voltage Range3	VDD	1.5	-	5.25	V	RESET output
Recommend Supply Voltage Range4	VDD	3.0	-	5.25	V	Bu-DET, MUTE, ACC-DET output

*The above conditions may not meet electrical characteristics.

*This product is not designed for normal operation within a radio active environment.

*The product described in this specification is a strategic product (and/or service) subject to COCOM regulations. It should not be exported without authorization from the appropriate government.

*Status of this document
The Japanese version of this document is the formal specification.
A customer may use this translation version only for a reference to help reading the formal version.
If there are any differences in translation version of this document, formal version takes priority.

○ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=25℃, +B/ACC=13.2V)

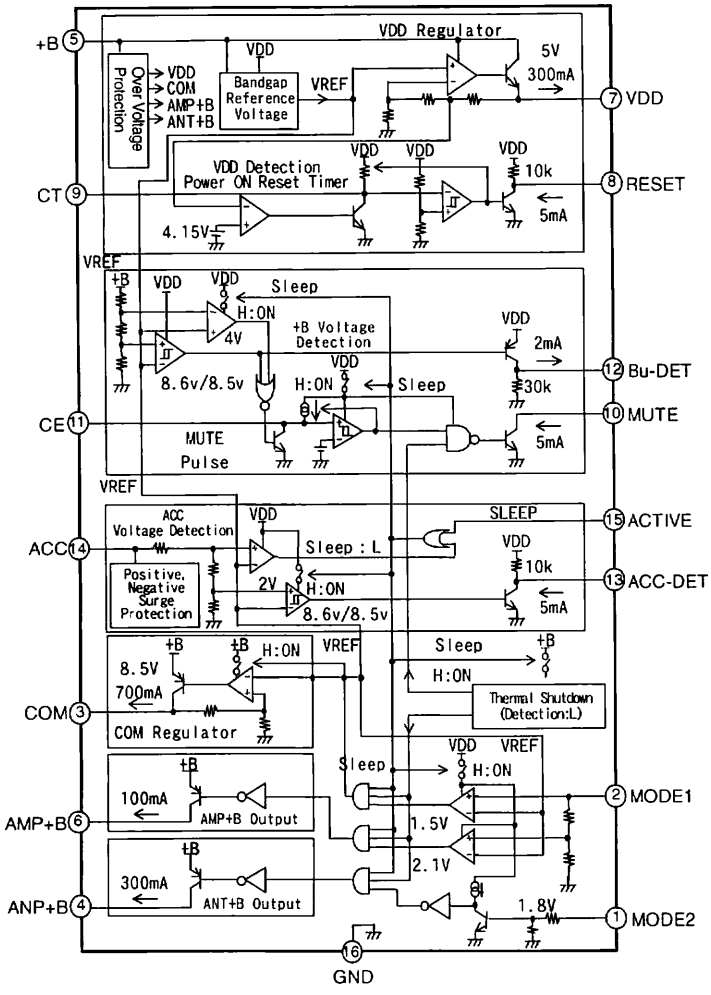
Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
+B Standby Current	IB1	–	100	120	μA	+B=13.2V ACC=0V
Bias Current	IB3	–	4.5	9.0	mA	MODE1, 2=5V, ACTIVE=5V
【VDD】						
Output Voltage	VDD	4.75	5.00	5.25	V	+B=6.6～18V, Io1=0～-300mA
Line Regulation	ΔVDDI	–	10	150	mV	Io1=-300mA +B=7～18V
Load Regulation	ΔVDDL	–	100	170	mV	Io1=-0.1mA→-300mA
Peak Output Current	IDDmax	300	700	–	mA	Vo1≧4.7V
Ripple Rejection	RRVDD	41	45	–	dB	f=100Hz, VRR=-10dBV, Io1=-300mA
Minimum Output Voltage	VDDL	2.5	–	–	V	+B=4V, Io1=-300mA
Short Current	IDDs	30	60	90	mA	Vo1=0V
Input Current	IiVDD	–	–	390	μA	VDD=5V, +B=0V
【COM】						MODE1=5V
Output Voltage	VCOM	8.1	8.5	8.9	V	+B=9.6～18V, Io2=0～-700mA
Line Regulation	ΔVCOMI	–	40	200	mV	Io2=-400mA +B=10.5～18V
Load Regulation	ΔVCOML	–	100	200	mV	Io2=-50mA→-700mA
Peak Output Current	ICOMmax	750	1250	–	mA	Vo2≧7.9V
Ripple Rejection	RRCOM	41	45	–	dB	f=100Hz, VRR=-10dBV, Io2=-700mA
Minimum Output Voltage	VCOML	2.5	–	–	V	+B=4V, Io2=-400mA
Short Current	ICOMs	45	90	135	mA	Vo2=0V
【AMP+B】						MODE1=5V
Dropout Voltage	VSATAMP	–	0.25	0.6	V	+B=9.6～18V, Io3=-100mA
Load Regulation	ΔVAMPL	–	270	500	mV	Io3=-10mA→-100mA
Peak Output Current	IAMPmax	150	300	–	mA	Vo3≧11.7V
Leak Current	IAMPleak	-10	–	10	μA	+B=18V, Vo3=0V, MODE1=0V
Short Resistor Input Current	IAMPin	84	167	250	μA	Vo3=5V, MODE1=0V
Minimum Output Voltage	VAMPL	2.5	–	–	V	+B=4V, Io3=-100mA
Short Current	IAMPs	20	40	60	mA	Vo3=0V
【ANT+B】						MODE2=5V
Dropout Voltage	VSATANT	–	0.35	0.9	V	+B=9.6～18V, Io4=-300mA
Load Regulation	ΔVANTL	–	300	700	mV	Io4=-10mA→-300mA
Peak Output Current	IAMPmax	450	800	–	mA	Vo4≧11.7V
Leak Current	IANTleak	-10	–	10	μA	+B=18V, Vo4=0V, MODE2=0V
Short Resistor Input Current	IANTin	170	400	630	μA	Vo4=5V, MODE2=0V
Minimum Output Voltage	VANTL	2.5	–	–	V	+B=4V, Io4=-300mA
Short Current	IANTs	45	90	135	mA	Vo4=0V
【RESET】						
Detection Voltage	VTRS	4.0	4.15	4.3	V	VDD Voltage
CT Charge Resistance1	RCT1	150	300	450	kΩ	RESET : L (while charging)
CT Charge Resistance 2	RCT2	15	30	45	kΩ	RESET : H (after charging is complete)
CT Discharge Resistance	ICT	-10.5	-7	-3.5	mA	VDD=4V, CT=1.33V
CT Threshold Voltage (rising)	VTHCT	3.00	3.33	3.66	V	
CT Threshold Voltage (falling)	VTLCT	0.7	1.5	2.2	V	
Saturation Voltage1	VRL1	–	–	0.4	V	VDD=4V, Io=5mA
Saturation Voltage2	VRL2	–	–	0.3	V	VDD=1.5V, Io=0.1mA
CT delay time	TRSoff	15	30	45	msec	CT=0.1μF
RESET ON delay time	TRSon	10	–	130	μsec	CT=0.1μF
Pull-up Resistance	RRESET	5	10	15	kΩ	VDD=5V

*Use Peak Output Current less than Limits Min. values.

○ELECTRICAL CHARACTERISTICS (Unless otherwise specified, Ta=25℃, +B/ACC=13.2V)

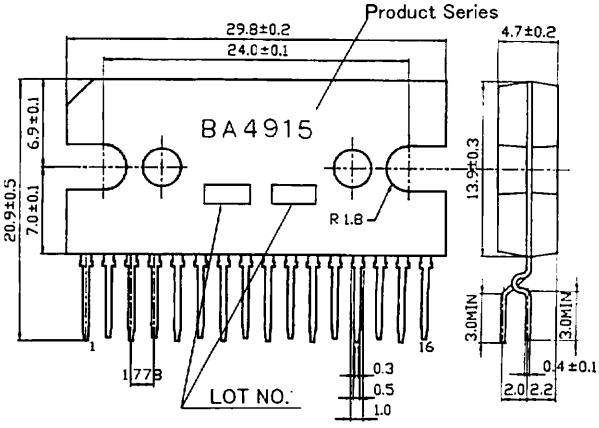
Parameter	Symbol	Limits			Unit	Condition
		Min.	Typ.	Max.		
【BuDET】						
ON threshold Voltage	VTH+B	8.1	8.6	9.1	V	V5 SWEEP UP
OFF threshold Voltage	VTL+B	8.0	8.5	9.0	V	V5 SWEEP DOWN
Hysteresis width	VHS+B	50	100	150	mV	CALC=VDN-VDF
Output Saturation Voltage	VBuH	VDD-0.7	—	—	V	IO=-1mA
Output Source Current	IBusource	—	—	-2	mA	IO=-2mA, VOM≧4V check
Pull-down Resistance	RB u DET	20	30	45	k Ω	IO=100 μA, 2V≦VOM≦4.5V check
【MUTE】						
CE threshold Voltage	VTHCE	2.8	3.1	3.4	V	V11 SWEEP UP, VO=5V
Hysteresis width	VHSCE	0.3	0.6	0.9	V	CALC=VTHCE-VM10, VO=5V
CE Discharge Resistance	IDIS	100	-	-	mA	V5/V14=7V, V11=2.5V
CE Charge Resistance 1	ITM1	-4.5	-3.0	-1.5	μA	V11=1.6V
CE Charge Resistance 2	ITM2	-45	-30	-15	μA	V11=VTHCE-0.1V
CE Standby Voltage	VOLCE	-	0.1	0.3	V	V5/V14=7V
MUTE Sink Current	IMUTEsink	5	-	-	mA	V5/V14=7V, IO=5mA, VM10≦1V check
MUTE Output Saturation Voltage	VMUTEL	-	-	0.3	V	V5/V14=7V, IO=1mA
MUTE Leak Current	IMUTEleak	-1	-	1	μA	VO=5V, VM10≧4.9V check
MUTE Pulse width	Tm	0.7	1.0	1.3	s ec	V5=0→13.2V
MUTE ON delay time	Td	-	-	10	μsec	CALC=0.9×1 μ/IDIS
+B MUTE detection Voltage1	VTHBM1	3.6	4.0	4.4	V	V5 SWEEP UP(0→5V)
+B MUTE detection Voltage2	VTHBM2	8.1	8.6	9.1	V	V5 SWEEP UP (7→9V)
+B MUTE detection Voltage3	VTHBM3	8.0	8.5	9.0	V	V5 SWEEP DOWN(9→7V)
Hysteresis width	VHSTHBM	50	100	150	mV	CALC=VTHBM2-VTHBM3
【ACC】						
ON threshold	VTHACC	8.1	8.6	9.1	V	V14 SWEEP UP
OFF threshold	VTLACC	8.0	8.5	9.0	V	V14 SWEEP DOWN
Hysteresis width	VHSACC	50	100	150	mV	CALC=VAN-VAF
ACC-DET Output Sink Current	IACCsink	5	—	—	mA	IO=5mA, VOM≦1V check
ACC-DET Output Saturation Voltage	VACCL	—	—	0.3	V	IO=1mA
ACC-DET Pull-up Resistance	RACCDET	5	10	15	k Ω	V14=0V, IO=100 μA, 3.5V≦VOM≦4.5V check
Input Current1	I ACC 1	—	—	36	μA	
Input Current2	I ACC 2	-10	—	10	μA	V14=0V
Negative Surge Clamp Voltage	VLACC	-0.35	-0.18	—	V	I1=-12mA
【SLEEP】						
ACC ON detection Voltage	VTACCON	1.8	2.0	2.2	V	V14 SWEEP UP
ACTIVE threshold Voltage	VTACTIVE	1.0	1.5	2.0	V	V14=0V, V15 SWEEP UP
ACTIVE Input Current	I ACTIVE	25	50	75	μA	V15=5V
【MODE1】						
Input threshold1	VTHMODE1	1.05	1.5	1.8	V	V2 SWEEP
Input threshold2	VTHMODE2	1.8	2.1	2.6	V	V2 SWEEP
Input Current	I INMODE 1	5	10	15	μA	V2=5V
【MODE2】						
Input threshold3	VTHMODE3	1.05	1.8	2.6	V	V1 SWEEP
Input Current	I INMODE2	33	66	100	μA	V1=5V

○BLOCK DIAGRAM



※Refer to the Technical Note about the details of the application.

○PHYSICAL DIMMENSIONS・MARKING



SIP-M16(V11) (Unit:mm)

○Pin No.・Pin Name

Pin No.	Pin Name
1	MODE2
2	MODE1
3	COM
4	ANP+B
5	+B
6	AMP+B
7	VDD
8	RESET
9	CT
10	MUTE
11	CE
12	Bu-DET
13	ACC-DET
14	ACC
15	ACTIVE
16	GND

○NOTES FOR USE

1. Over Voltage Protection Circuit
   The Over Voltage Protection Circuit function is that when the difference voltage of VIN1 and GND exceeds over about 27V (room temperature), the each output turn off. Please be sure of the power supply voltage range you use.
2. Bypass Capacitor between +B and Gnd
   It recommend to put into bypass capacitor with 0.47μF degree into the nearest position between +B and Gnd.
3. The oscillation stopper of output capacitor
   Please use the oscillation stopper between the ANT+B, AMP+B, COM, VDD each output and GND. It recommend to use the Electrical Capacitor 10μF and Ceramic Capacitor 0.1μF (B-class) in pararell for ANT+B and AMP+B, the Electrical Capacitor 10μF and the Ceramic Capacitor over 1μF (B-class) and serial resistor 1Ω in pararell for COM, and for VDD using the Super Capacitor 47μF (TOKIN, 5.5V) and the electrical Capacitor over 10μF and Ceramic Capacitor 0.22μF (B-class) in pararell and not using it the electrical Capacitor over 10μF and Ceramic Capacitor 1μF (B-class) and serial 2.2Ω in pararell.
4. MUTE pin pull-up resister
   Connect the Mute pin pull-up resister to less than VDD voltage.
5. +B plus surge
   In case of the over 50V surge at +B, use the Power Zener Diode between +B-Gnd.
6. +B minus surge
   In case of the less than Gnd voltage at +B, use the Protection Diode between +B-Gnd.
7. Plus and Minus surge at ACC
   In case of the over 120V at ACC, use the shotteky diode or diode between ACC-Gnd.
8. ACC terminal
   10kΩ serial resistor at ACC, have to be high accuray : temperature characteristics etc. But, you use except 10kΩ, ACC threshold voltage and hysterysis voltage change.
   In case of the over 33pF capacitor at ACC, the over terminal might occur error function. Please be sure to the application.

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As of 18th. April 2005