DC/DC regulators
Input 9.0 - 16.0 V
Output Current 16 A

Key Features

- Surface mountable
- Wide Input
- Low profile, max 8.5mm (0.33 in)
- High efficiency
- Low weight
- Designed for Environment, DfE
- Lead-free / Bromine-free
- Power Good

The PMA series of DC/DC regulators (POL) are intended to be used as local distributed power sources in distributed power architecture level 4. The PMA series use a ceramic substrate with fine-pitch components technology and a high degree of silicon integration. Together with the electrical design using low Rds-On MOSFET, this provides excellent thermal management, high reliability and high efficiency. The high efficiency makes it possible to operate over a wide temperature range, without adding any external heat dissipator. The high reliability and the low profile of the PMA series makes them particularly suited for the communications equipment of today and tomorrow and applications with board spacing down to 15 mm (0.6 in). The flat case top enables pick-and-place handling and provides a surface for attachment to cooling surfaces in areas with limited air flow.
These products are manufactured using the most advanced technologies and materials to comply with environmental requirements. Designed to meet high reliability requirements of systems manufacturers, the PMA responds to world-class specifications.
Ericsson Power Modules is an ISO 9001/14001 certified supplier.

Absolute Maximum Ratings

Characteristics		min	max	Unit
T_C	Maximum Operating Case Temperature	-45	+110	°C
T_S	Storage temperature	-55	+125	°C
V_I	Input voltage	-0.3	+18	Vdc

Note:
Stress in excess of Absolute Maximum Ratings may cause permanent damage. Absolute Maximum Ratings, sometimes referred to as no destruction limits, are normally tested with one parameter at a time exceeding the limits of Output data or Electrical Characteristics. If exposed to stress above these limits, function and performance may degrade in an unspecified manner.

Input

T_C = -30 °C ... +90 °C, V_I = 9 ... 16V unless otherwise specified
Typ values specified at: T_C = +25 °C, $V_I$nom. $V_I$nom = 12 V, $I_o$max = 16 A

Characteristics		Conditions	min	typ	max	Unit
V_I	Input voltage range		9.0	12	16.0	Vdc
V_{Ioff}	Turn-off input voltage	Ramping from higher voltage		5.6		Vdc
V_{Ion}	Turn-on input voltage	Ramping from lower voltage		5.8		Vdc
C_I	Input capacitance			10		μF
P_{Ii}	Input idling power	I_o= 0		0.6	2.0	W
P_{RC}	Input stand-by power (RC active)	Non operation			0.75	mW
$V_I$ac	Input ripple	20Hz...5MHz, $I_o$max		1000 1)		mV

1) Measured with L = 1.6 μH and 4.7 μF at the input.

Environmental Characteristics

Characteristics			
Random Vibration	IEC 68-2-34E_d	Frequency Acceleration density	10 ... 500 Hz 0.5 g^2/Hz
Vibration (Sinusoidal)	IEC 68-2-6 F_c	Frequency range Acceleration amplitude Number of cycles	10 ... 500 Hz 10 g or displacement amplitude 0.75 mm 10 in each axis
Mechanical shock (half sinus)	IEC 68-2-27 E_a	Peak acceleration Duration	200 g 3 ms
Temperature cycling	IEC 68-2-14 N_a	Temperature Number of cycles	-40 ... +125 °C 500
Accelerated damp heat	IEC 68-2-3 C_a with bias	Temperature Humidity Duration	+85 °C 85 % RH 1000 hours
Solderability	IEC 68-2-54	Solde immersion depth Time for onset of wetting Wetting force	2 mm < 2.5 s > 200 mN/m
Resistance to cleaning solvents	Moulded package Laser marking	Fluid	All commercially avail-able
Cold (in operation)	IEC 68-2-1, test A_a	Temperature	-45 °C
Storage	IEC 68-2-2 B_a	Temperature Duration	+125 °C 1000 h

Safety

The PMA 8000 series DC/DC regulators are designed in accordance with safety standards IEC/EN/UL 60 950, *Safety of Information Technology Equipment*.

The PMA 8000 series DC/DC regulators are UL 60 950 recognized and certified in accordance with EN 60 950.

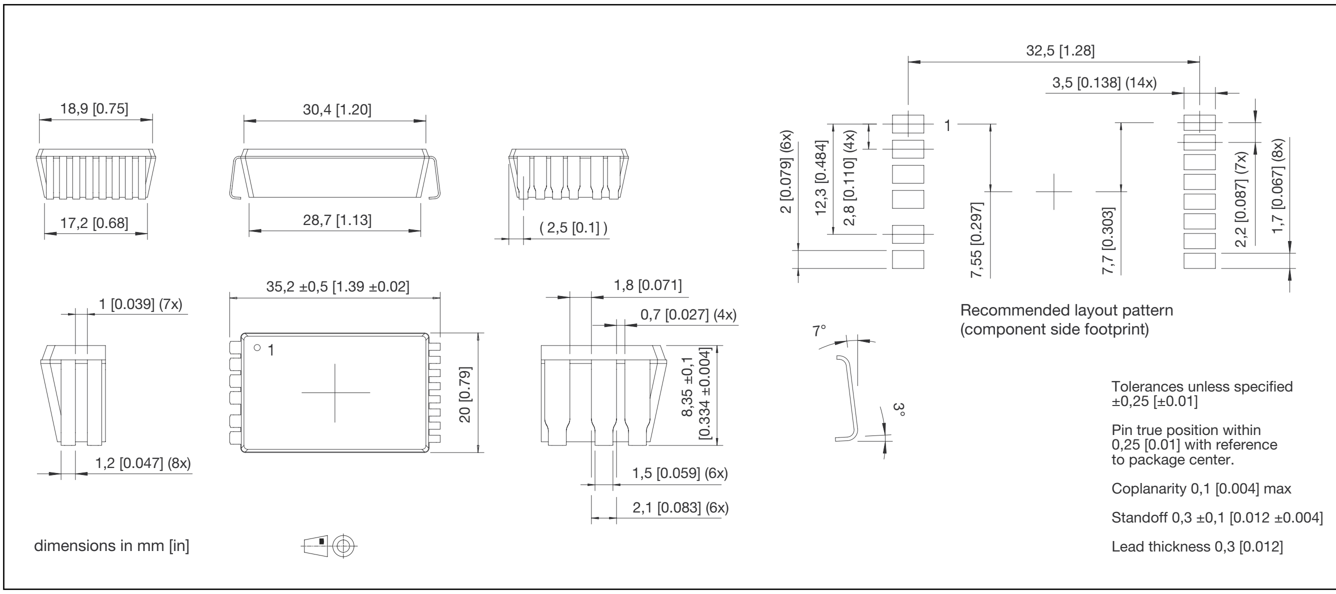
The DC/DC regulator should be installed in the end-use equipment, in accordance with the requirements of the ultimate application. The input source must be isolated by minimum Reinforced or Double insulation from the primary circuit in accordance with IEC/EN/UL 60 950. If the input voltage to the DC/DC regulator is SELV (Safety Extra Low Voltage) then the output remains SELV under normal and abnormal operating conditions.

It is recommended that a slow blow fuse with a rating of 25A be used at the input of each DC/DC regulator. If a fault occurs in the regulator that imposes a short circuit on the input source, this fuse will provide the following functions:

- Isolate the faulty DC/DC regulator from the input power source not to affect the operation of other parts of the system.
- Protect the distribution wiring from excessive current and power loss thus preventing hazardous overheating.

The flammability rating for all construction parts of the DC/DC regulator meets UL 94V-0.

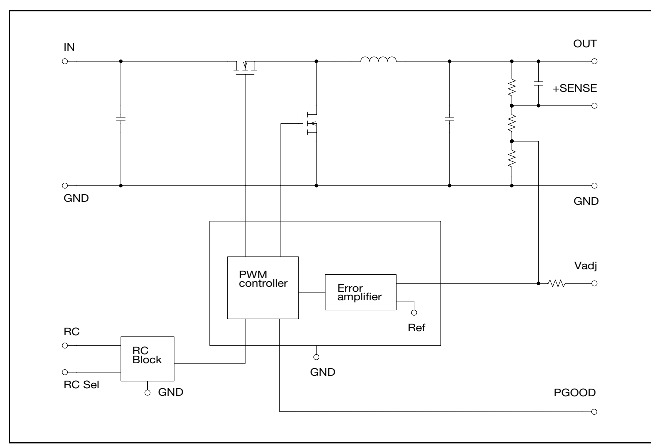
Mechanical Data



Connections

Pin	Designation	Function
1-2	+ Out	Output voltage
3-4	Gnd	Ground
5-6	+ In	Input voltage
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected
10	RC	Remote control, To turn-on and turn-off the regulator
11	Select	Select pin for pos/neg logic
12	Vadj	Output voltage adjust
13	+Sense	Remote sensing
14	PGOOD	Power Good signal

Fundamental Circuit Diagram



Weight

PMA 8000 SF 12g

Case

Material: Semiconductor grade epoxy.
Coefficient of thermal expansion (CTE) is typ. 10 ppm/°C

Pins

Material: Copper
Plating: Palladium (Pd) over Nickel (Ni)

PMA 8218H Output

T_C = –30 … +90 °C, V_I = 9 ... 16 V unless otherwise specified. A 150 µF low ESR output capacitor must be used.
Typ values specified at: T_C = +25 °C and $V_I$nom. $V_I$nom = 12 V, $I_O$max = 16 A. Note: +Sense must be connected to +Out

Characteristics		Conditions	Output min	Output typ	Output max	Unit
V_{Oi}	Output voltage initial setting and accuracy	T_C = +25 °C, $V_I$nom, $I_O$max	1.47	1.5	1.53	V
	Output adjust range	T_C = +25 °C, $V_I$nom, $I_O$max	1.00		2.40	V
V_O	Output voltage tolerance band	I_O = 0.1...1.0 x $I_O$max, V_I = 9 ... 16 V	1.44		1.56	V
	Idling voltage	I_O = 0	1.47		1.53	V
	Line regulation	$V_I$min ... $V_I$max, $I_O$max		5		mV
	Load regulation	I_O = 0.01...1.0 x $I_O$max, $V_I$nom		8		mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 ... 0.75 x $I_O$max dI/dt = 5 A/µs		200		mV
t_{tr}	Load transient recovery time			40		µs
T_{coeff}	Temperature coefficient	T_C = -30 ... 90 °C, $I_O$max		± 0.2		mV/°C
t_r	Ramp-up time	0.1...0.9 x V_O, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			1	ms
t_s	Start-up time	From V_I connected to V_O = 0.9 x V_{OI}, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			5	ms
t_{RC}off	RC shut-down time to V_O x 0.1	I_O = $I_O$max, $V_I$nom		0.1		ms
t_{RC}on	RC start-up time to V_O x 0.9	I_O = $I_O$max, $V_I$nom		3		ms
I_O	Output current		0		16	A
$P_O$max	Max output power	At V_O = V_{Onom}	28.8			W
I_{lim}	Current limit threshold	T_C < $T_C$max	23	28	37	A
V_{Oac}	Output ripple	20 Hz ... 5 MHz, $I_O$max		30	50	mV_{p-p}

Miscellaneous

η	Efficiency - 50% load	I_O = 0.5 x $I_O$max		87.5		%
η	Efficiency - 100% load	I_O = $I_O$max	81	83.5		%
P_d	Power Dissipation	I_O = $I_O$max		4.8	5.6	W
Fo	Switching frequency	I_O = 0 ... 1.0 x $I_O$max	250	300	350	kHz
I_{sense}	Remote sense current				8	mA
I_I	Static input current	V_I = 9 V, I_O = $I_O$max, T_C = 25°C		3.2		A
MTBF	Predicted reliability	T_C = 40°C, TelCordia SR 332		5.7		million hours

External Input Capacitors (required)

I_O [A]	Min. Capacitance	Desired Input Ripple [mV] 150	250	500
4	2 x 4.7 µF	-	-	-
8	2 x 4.7 µF	5 x 4.7 µF	3 x 4.7 µF	-
12	2 x 4.7 µF	10 x 4.7 µF	5 x 4.7 µF	3 x 4.7 µF
16	2 x 4.7 µF	13 x 4.7 µF	7 x 4.7 µF	4 x 4.7 µF

PMA 8218H Typical Characteristics

Output Voltage Adjust

The resistor value for an adjusted output voltage is calculated by using the following formulas:

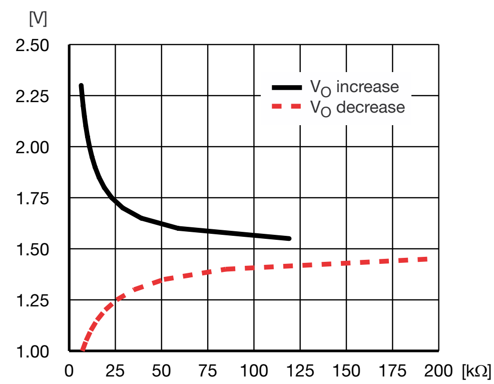
Output Voltage Adjust Upwards, Increase:
R_{adj}= (6.0/(V_O-1.5))-1 [kΩ]

Output Voltage Adjust Downwards, Decrease:
R_{adj}= (6.72(V_O-0.6))/(0.6-(0.67(V_O-0.6)))-1 [kΩ]

E.g. Increase to V_O = 2.0 V
6.0/(2.0-1.5)-1 = 11 [kΩ]

E.g. Decrease to V_O = 1.2 V
(6.72(1.2-0.6))/(0.6-(0.67(1.2-0.6)))-1 = 19.4 [kΩ]

Output Voltage Adjust



Output voltage vs. Output voltage adjust resistor value.

PMA 8510 Output

T_C = –30 … +90 °C, V_I = 9 … 16 V unless otherwise specified.
A 150 µF low ESR output capacitor must be used for input voltages over 15 V at 2.5 V out and above.
Typ values specified at: T_C = +25 °C and $V_I$nom. $V_I$nom = 12 V, $I_O$max = 16 A. Note: +Sense must be connected to +Out

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C = +25°C, $V_I$nom, $I_O$max	3.24	3.3	3.36	V
	Output adjust range	T_C = +25°C, $V_I$nom, $I_O$max	2.30		3.63	V
V_O	Output voltage tolerance band	I_O = 0.1...1.0 x $I_O$max, V_I = 9 ... 16 V	3.17		3.43	V
	Idling voltage	I_O = 0	3.20		3.40	V
	Line regulation	$V_I$min ... $V_I$max, $I_O$max		7		mV
	Load regulation	I_O = 0.01...1.0 x $I_O$max, $V_I$nom		10		mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 ... 0.75 x $I_O$max, dI/dt = 5A/µs		220		mV
t_{tr}	Load transient recovery time			45		µs
T_{coeff}	Temperature coefficient	T_C = -30 ... 90°C, $I_O$max		± 0.2		mV/°C
t_r	Ramp-up time	0.1...0.9 x V_O, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			3	ms
t_s	Start-up time	From V_I connected to V_O = 0.9 x V_{OI}, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			6.5	ms
t_{RC}off	RC shut-down time to V_O x 0.1	I_O = $I_O$max, $V_I$nom		0.1		ms
t_{RC}on	RC start-up time to V_O x 0.9	I_O = $I_O$max, $V_I$nom		4.3		ms
I_O	Output current		0		16	A
$P_O$max	Max output power	At V_O = V_{Onom}	52.8			W
I_{lim}	Current limit threshold	T_C < $T_C$max	23	30	37	A
V_{Oac}	Output ripple	20Hz ... 5MHz, $I_O$max		35	50	mV_{p-p}

Miscellaneous

η	Efficiency - 50% load	I_O = 0.5 x $I_O$max		93		%
η	Efficiency - 100% load	I_O = $I_O$max	88	91		%
P_d	Power Dissipation	I_O = $I_O$max		5.3	7.2	W
Fo	Switching frequency	I_O = 0 ... 1.0 x $I_O$max	250	300	350	kHz
I_{sense}	Remote sense current				8	mA
I_I	Static input current	V_I = 9 V, I_O = $I_O$max, T_C = 25°C		6.4		A
MTBF	Predicted reliability	T_C = 40°C, TelCordia SR 332		5.7		million hours

External Input Capacitors (required)

I_O [A]	Min. Capacitance	Desired Input Ripple [mV]		
		150	250	500
4	2 × 4.7 µF	5 × 4.7 µF	3 × 4.7 µF	-
8	2 × 4.7 µF	12 × 4.7 µF	9 × 4.7 µF	3 × 4.7 µF
12	2 × 4.7 µF	14 × 4.7 µF	12 × 4.7 µF	6 × 4.7 µF
16	2 × 4.7 µF	16 × 4.7 µF	14 × 4.7 µF	8 × 4.7 µF

PMA 8510 Typical Characteristics

Output Voltage Adjust

The resistor value for an adjusted output voltage is calculated by using the following formulas:

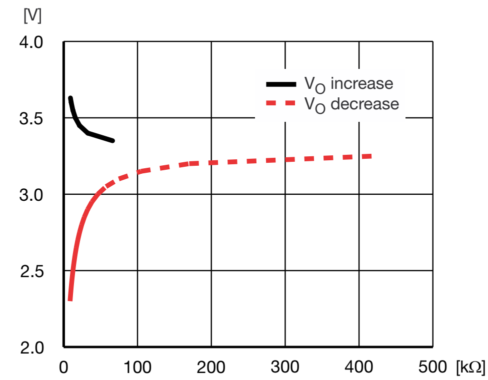
Output Voltage Adjust Upwards, Increase:
$R_{adj} = (3.362/(V_O - 3.3)) - 1$ [kΩ]

Output Voltage Adjust Downwards, Decrease:
$R_{adj} = ((1.25(V_O - 0.6))/(0.6 - (0.223(V_O - 0.6)))) - 1$ [kΩ]

E.g. Increase to $V_O = 3.4$ V
3.362/(3.4-3.3)-1 = 32.6 [kΩ]

E.g. Decrease to $V_O = 3.0$ V
(1.25(3.0-0.6))/(0.6-(0.223(3.0-0.6)))-1 = 45.3 [kΩ]

Output Voltage Adjust



Output voltage vs. Output voltage adjust resistor value.

PMA 8811 Output

T_C = –30 … +90 °C, V_I = 9 ... 16 V unless otherwise specified.
Typ values specified at: T_C = +25 °C and $V_I$nom. $V_I$nom = 12 V, $I_O$max = 16 A. Note: +Sense must be connected to +Out

Characteristics		Conditions	Output			Unit
			min	typ	max	
V_{Oi}	Output voltage initial setting and accuracy	T_C = +25°C, $V_I$nom, $I_O$max	4.90	5.0	5.10	V
	Output adjust range	T_C = +25°C, $V_I$nom, $I_O$max	4.50		5.50	V
V_O	Output voltage tolerance band	I_O = 0.1...1.0 x $I_O$max, V_I = 9 ... 16 V	4.80		5.20	V
	Idling voltage	I_O = 0	4.90		5.10	V
	Line regulation	$V_I$min ... $V_I$max, $I_O$max		10		mV
	Load regulation	I_O = 0.01...1.0 x $I_O$max, $V_I$nom		15		mV
V_{tr}	Load transient voltage deviation	Load step = 0.25 ... 0.75 x $I_O$max, dI/dt = 5A/μs		220		mV
t_{tr}	Load transient recovery time			50		μs
T_{coeff}	Temperature coefficient	T_C = -30 ... 90°C, $I_O$max		± 0.2		mV/°C
t_r	Ramp-up time	0.1...0.9 x V_O, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			5	ms
t_s	Start-up time	From V_I connected to V_O = 0.9 x V_{OI}, I_O = 0.1 ...1.0 x $I_O$max, $V_I$nom			8	ms
t_{RC}off	RC shut-down time to V_O x 0.1	I_O = $I_O$max, $V_I$nom		0.1		ms
t_{RC}on	RC start-up time to V_O x 0.9	I_O = $I_O$max, $V_I$nom		7		ms
I_O	Output current		0		16	A
$P_O$max	Max output power	At V_O = V_{Onom}	80			W
I_{lim}	Current limit threshold	T_C < $T_C$max	23	30	37	A
V_{Oac}	Output ripple	20Hz ... 5MHz, $I_O$max		50	80	mV_{p-p}

Miscellaneous

η	Efficiency - 50% load	I_O = 0.5 x $I_O$max		95		%
η	Efficiency - 100% load	I_O = $I_O$max	91	93.5		%
P_d	Power Dissipation	I_O = $I_O$max		5.6	8.0	W
Fo	Switching frequency	I_O = 0 ... 1.0 x $I_O$max	250	300	350	kHz
I_{sense}	Remote sense current				8	mA
I_I	Static input current	V_I = 9 V, I_O = $I_O$max, T_C = 25°C		9.6		A
MTBF	Predicted reliability	T_C = 40°C, TelCordia SR 332		5.7		million hours

External Input Capacitors (required)

I_O [A]	Min. Capacitance	Desired Input Ripple [mV]		
		150	250	500
4	2 × 4.7 μF	6 × 4.7 μF	3 × 4.7 μF	-
8	2 × 4.7 μF	9 × 4.7 μF	7 × 4.7 μF	3 × 4.7 μF
12	2 × 4.7 μF	14 × 4.7 μF	12 × 4.7 μF	6 × 4.7 μF
16	2 × 4.7 μF	18 × 4.7 μF	14 × 4.7 μF	10 × 4.7 μF

PMA 8811 Typical Characteristics

Output Voltage Adjust

The resistor value for an adjusted output voltage is calculated by using the following formulas:

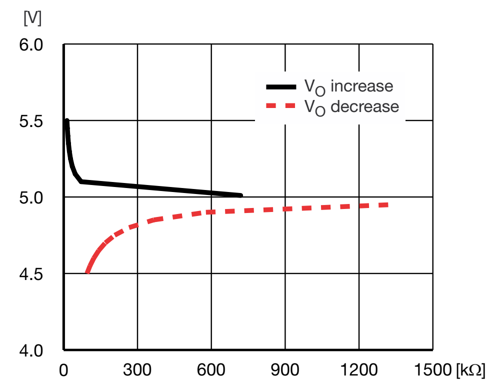
Output Voltage Adjust Upwards, Increase:
R_{adj}= (7.202/(V_O-5.0))-1 [kΩ]

Output Voltage Adjust Downwards, Decrease:
R_{adj}= ((1.64(V_O-0.6))/(0.6-(0.137(V_O-0.6))))-1 [kΩ]

E.g. Increase to V_O = 5.2 V
7.202/(5.2-5.0)-1 = 35 [kΩ]

E.g. Decrease to V_O = 4.7 V
(1.64(4.7-0.6))/(0.6-(0.137(4.7-0.6)))-1 = 174.5 [kΩ]

Output Voltage Adjust



Output voltage vs. Output voltage adjust resistor value.

EMC Specification

Layout Recommendation

The radiated EMI performance of the DC/DC regulator will be optimised by including a ground plane in the PCB area under the DC/DC regulator. This approach will return switching noise to ground as directly as possible, with improvements to both emission and susceptibility.

Operating Information

Remote Control (RC)

The PMA 8000 Series DC/DC regulators have remote control function, with both negative and positive logic options. The RC function is CMOS open drain compatible. Maximum sink current is 1mA. The (RC) and (Select) pins have identical functions meaning that the functions may be inverted. If either one of the pins is shorted to ground the regulator is turned off. If both pins are are shorted to ground or both pins are disconnected the regulator is turned on.

Positive logic:
To choose positive logic, leave the Select pin open = 1.

Negative logic:
To choose negative logic, connect the Select pin to GND = 0.

With the RC pin, i.e. with a suitable open collector function, the ON/OFF condition of the regulator may be controlled.

RC	Select	Regulator condition
0	0	ON
1	0	OFF
0	1	OFF
1	1	ON

0= Defined as low voltage level, 0-0.3V
1= Defined as high voltage level, approx. 4V, (internal level)

Remote Sense

All PMA 8000 Series DC/DC regulators have a positive remote sense pin that can be used to compensate for moderate amounts of resistance in the distribution system and allow for voltage regulation at the load or other selected point. The remote sense line will carry very little current and does not need a large cross sectional area. However, the sense line on the PCB should be located close to a ground trace or ground plane. The remote sense circuitry will compensate for up to 10% voltage drop between the sense voltage and the voltage at the output pins from $V_O$nom. If the remote sense is not needed the sense pin should be connected to +Out.

PGOOD

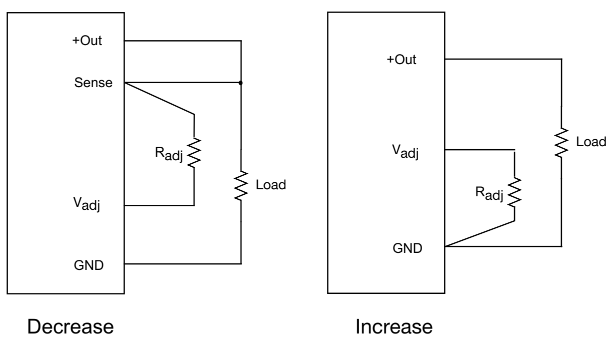
A Power Good signal, error flag indicator (TTL levels). If the output voltage is 18% over or 30% below it's nominal value the power good flag goes low.

V_O condition	PGOOD state
< 82 %	Low
82 % $\leq V_O \leq$ 130 %	High
> 130 %	Low

Operating Information

Output Voltage Adjust (V_{adj})

All PMA 8000 Series DC/DC regulators have an Output Voltage adjust pin (Vadj). This pin can be used to adjust the output voltage above or below Output voltage initial setting. Note that at increased output voltages the maximum power rating of the regulator remains the same, and the output current capability will decrease correspondingly. To decrease the output voltage the resistor should be connected between V_{adj} pin and the Sense pin. To increase the voltage the resistor should be connected between V_{adj} pin and the GND pin. The resistor value of the Output voltage adjust function is according to information given under the output section.



Circuit configuration for output voltage adjust

Current Limit Protection

The PMA 8000 Series DC/DC regulators include current limiting circuitry that allows them to withstand continuous overloads or short circuit conditions on the output. The current limit is of hick-up mode type.
The regulator will resume normal operation after removal of the overload. The load distribution system should be designed to carry the maximum output short circuit current specified.

Over Temperature Protection (OTP)

The PMA 8000 Series DC/DC regulators are protected from thermal overload by an internal over temperature shutdown circuit. When the case temperature (center of case) exceeds 140 ºC the regulator will shut down immediately.
The regulator will return to normal operation when the over temperature degrades.

Input And Output Impedance

The impedance of both the power source and the load will interact with the impedance of the DC/DC regulator. It is most important to have a low characteristic impedance, both at the input and output, as the regulators have a low energy storage capability. Use capacitors across the input if the source inductance is greater than 4.7µH. Suitable input capacitors are 47µF-220µF low ESR ceramics.
Max output capacitance is 5000µF. The use of low ESR capacitors is important and should be <15 mΩ.

Maximum Capacitive Load

When powering loads with significant dynamic current requirements, the voltage regulation at the load can be improved by addition of decoupling capacitance at the load. The most effective technique is to locate low ESR ceramic capacitors as close to the load as possible, using several capacitors to lower the total ESR. These ceramic capacitors will handle short duration high-frequency components of dynamic load changes. In addition, higher values of capacitors should be used to handle the mid-frequency components. It is equally important to use good design practise when configuring the DC distribution system.
Low resistance and low inductance PCB layouts and cabling should be used. Remember that when using remote sensing, all resistance, inductance and capacitance of the distribution system is within the feedback loop of the regulator. This can affect on the regulators compensation and the resulting stability and dynamic response performance. The PMA 8000 series regulator can accept up to 5mF of capacitive load on the output at full load. This gives <500µF/A of I_O.

Parallel Operation

The PMA 8000 Series DC/DC regulators can be connected in parallel with a common input. Paralleling is accomplished by connecting the output voltage pins directly and using a load sharing device on the input. Layout considerations should be made to avoid load imbalance and it is recommended not to use more power than that of each individual regulator. For more details on paralleling, please consult the separate Application Note AN202A.

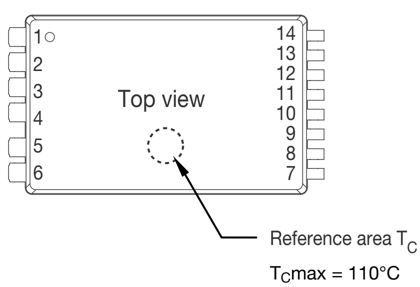
Thermal Considerations

General

The PMA 8000 Series DC/DC regulators are designed to operate in a variety of thermal environments, however sufficient cooling should be provided to help ensure reliable operation. Heat is removed by conduction, convection and radiation to the surrounding environment. Increased airflow enhances the heat transfer via convection. The available load current vs. ambient air temperature and airflow at V_{in}=5.0 V for each model is according to the information given under the output section.

Test conditions:

The test is done in a wind tunnel with a cross section of 305x305 mm, the DC/DC regulator horisontally mounted on a 8 layer, 35 µm copper, PCB with a size of 254 x 254 mm. Board spacing is 15 mm. Proper cooling can be verified by measuring the temperature on top of the case.

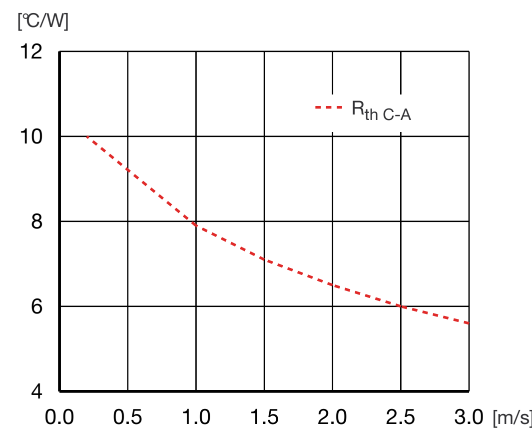


Calculation of ambient temperature

By using the thermal resistance the maximum allowed ambient temperature can be calculated.

A. The powerloss is calculated by using the formula
((1/η) - 1) × output power = power losses.
η = efficiency of regulator. Example: 95% = 0.95

B. Find the value of the thermal resistance $R_{th\ C\text{-}A}$ in the diagram by using the airflow speed at the module. Take the thermal resistance × powerloss to get the temperature increase.



Thermal resistance vs. airspeed measured at the regulator.

C. Max allowed calculated ambient temperature is:
Max T_C of DC/DC regulator - temperature increase.

Example: PMA 8811 at 1m/s:

A. ((1/0.935) - 1) × 80 W = 5.6 W

B. 5.6 W × 8 °C/W = 45 °C

C.110°C - 45 °C = max ambient temperature is 65 °C

The real temperature will be dependent on several factors, like PCB size and type, direction of airflow, air turbulence etc. It is recommended to verify the temperature by testing.

Miscellaneous

Soldering Information

The PMA 8000 series DC/DC regulators are intended for reflow soldering processes. Extra precautions must be taken when reflow-soldering the module. Neglecting the soldering information provided may result in permanent damage or significant degradation of the regulator performance. No responsibility is assumed if these recommendations are not strictly followed.

The regulator may be reflow soldered using vapour phase reflow (VPR) or forced convection reflow processes. The high thermal mass of the component and its effect on the temperature differences (ΔT) over a PCB means that particular attention should be paid to other temperature sensitive components.

For successful soldering of the PMA 8000 series DC/DC regulators, both pin temperature and case temperature must be monitored:

- Minimum temperature of the pins: to ensure reliable solder joints
- Maximum temperature of the regulator case: to avoid overheating

Minimum temperature:

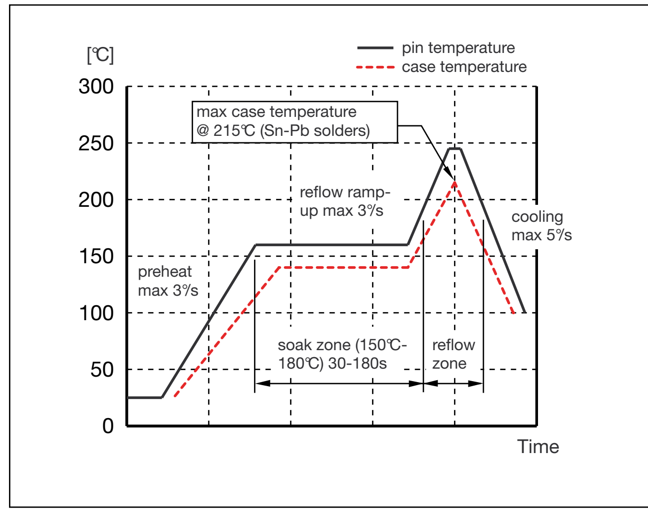
Most important is to ensure that the pins on the coolest side reach sufficient soldering temperature for a sufficient time. Therefore, the pin temperature measurements should be done on both sides of the module, preferrably on the middle pins (3/4 and 11/12).

The pins of the module are palladium plated. In order to guarantee a reliable solder joint, a pin temperature (T_P) in excess of the solder fusing temperatue (183°C for Sn/Pb 63/37) for 25 seconds, and a peak temperature above 195°C should be reached.

Maximum temperature:

To avoid damage to the module, the reflow profile should be optimised to avoid overheating. The case temperature (T_C) should be monitored with a thermocouple attached to the center of the top of the case using an adhesive or heat conductive paste.

A sufficiently extended soak time is recommended to ensure an even temperature throughout the PCB, for both small and large components. To reduce the risk of overheating the module it is also recommended to minimise the time in reflow as much as possible.



Conventional Sn-Pb convection solder process

For conventional Sn-Pb solder processes, the PMA 8000 series regulator is qualified for MSL 1 according to Jedec standard (J-STD-020b July 2002).

During reflow, the case temperature must not exceed 215°C at any time.

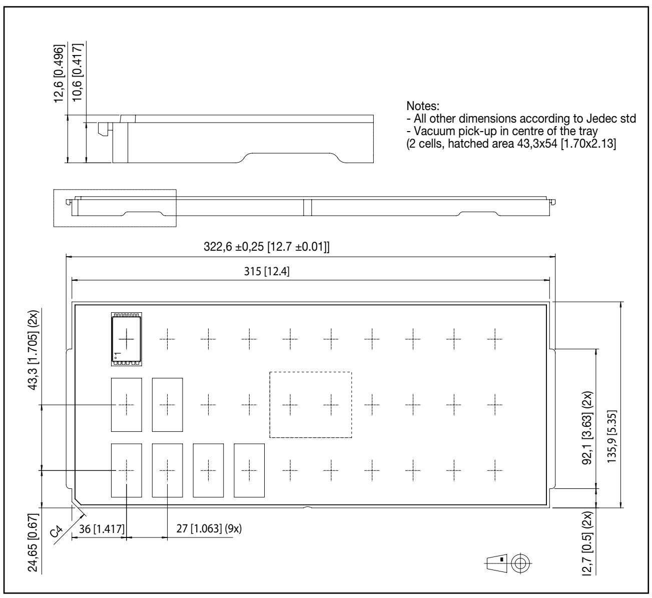
Miscellaneous

Delivery Package Information

PMA 8000 series is delivered in antistatic injection moulded trays (Jedec standard layout) or tape & reel (EIA standard).

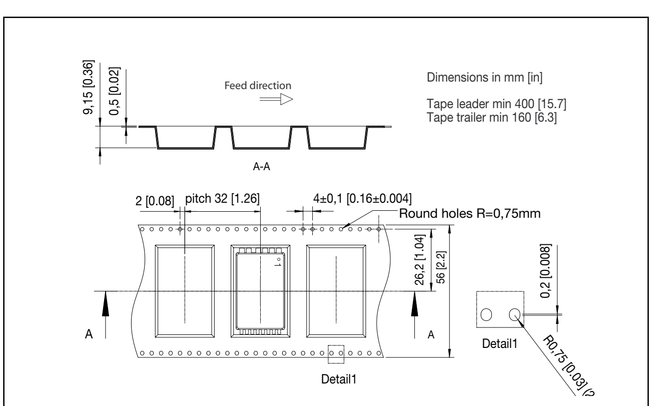
Tray Specification

Material:	Polyphenylene ether (PPE)
Surface resistance:	$1x10^5$ - $9x10^{12}$ Ω/sq
Color:	Black
Capacity:	30 pcs/tray
Loaded tray stacking pitch:	10.6 mm [0.417 inch]
Empty weight:	145 g
Full weight:	505 g



Tape & Reel Specification

Material:	Conductive Polystyrene (PS)
Tape width:	56 mm [2.20 inch]
Tape pitch:	32 mm [1.26 inch]
Total pocket height:	9.5 mm [0.37 inch]
Reel diameter:	330 mm [13 inch]
Reel hub diameter:	100 mm [4 inch]
Reel capacity:	150 pieces
Full reel weight:	typ. 2.5 kg



Quality

Reliability

The Mean Time Between Failure (MTBF) of the PMA 8000 series DC/DC regulator family is calculated to be greater than (>) 5.7 million hours at full output power and a case temperature of +40°C using TelCordia SR 332.

Quality Statement

The PMA 8000 series DC/DC regulators are designed and manufactured in an industrial environment where quality systems and methods like ISO 9000, 6σ (sigma), and SPC are intensively in use to boost the continuous improvements strategy. Conservative design rules, design reviews and product qualifications, plus the high competence of an engaged work force, contribute to the high quality of our products.

Limitation of Liability

Ericsson Power Modules does not make any warranties, expressed or implied including any warranty of merchantability or fitness for a particular purpose (including, but not limited to, use in life support applications, where malfunctions of product can cause injury to a person's health or life).

Product Program

V_I	V_O/I_O max	P_O max	Ordering No.
	Output 1		
9 - 16 V	1.0 - 2.4 V/16 A	29 W	PMA 8218H SF
9 - 16 V	2.3 - 3.6 V/16 A	53 W	PMA 8510 SF
9 - 16 V	4.5 - 5.5 V/16 A	80 W	PMA 8811 SF

For more information about the complete product program, please refer to our website: www.ericsson.com/powermodules

Ordering Information

Delivery option	M.o.q.	Suffix	Example
Tray	150 pcs	/B	PMA 8xxx SF/B
Tape & Reel	300 pcs	/C	PMA 8xxx SF/C

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Advanced Product Information

EN/LZT 146 059 R1A