

Green Mode Power Switch

FSDM0265RNB, FSDM0365RNB

Description

The FSDM0x65RNB of integrated Pulse Width Modulator (PWM) and SENSEFET[®] are specifically designed for high performance offline Switch Mode Power Supplies (SMPS) with minimal external components. This device is an integrated high voltage power switching regulator which combines an avalanche rugged SENSEFET with a current mode PWM control block. The integrated PWM controller features include: a fixed oscillator with frequency modulation for reduced EMI, Under Voltage Lock Out (UVLO) protection, Leading Edge Blanking (LEB), an optimized gate turn-on/turn-off driver, Thermal Shut Down (TSD) protection and temperature compensated precision current sources for loop compensation and fault protection circuitry. The FSDM0x65RNB offers better performance in Soft Start than FSDM0265RN. When compared to a discrete MOSFET and controller or RCC switching converter solution, the FSDM0x65RNB reduces total component count, design size, weight while increasing efficiency, productivity and system reliability. This device provides a basic platform that is well suited for the design of cost-effective flyback converters.

Features

- Internal Avalanche Rugged SENSEFET
- Consumes only 0.65 W at 240 VAC & 0.3 W load with Advanced Burst-Mode Operation
- Frequency Modulation for EMI Reduction
- Precision Fixed Operating Frequency
- Internal Start-up Circuit
- Pulse-by-Pulse Current Limiting
- Over Voltage Protection (OVP)
- Over Load Protection (OLP)
- Internal Thermal Shutdown Function (TSD)
- Auto-Restart Mode
- Under Voltage Lockout (UVLO)
- Low Operating Current (3 mA)
- Adjustable Peak Current Limit
- Built-in Soft Start

Applications

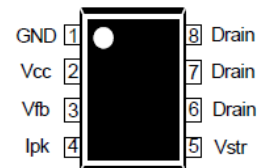
- SMPS for VCR, SVR, STB, DVD & DVCD
- SMPS for Printer, Facsimile & Scanner
- Adapter for Camcorder



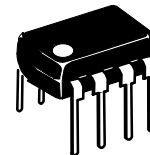
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8DIP

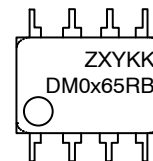


PIN CONFIGURATION



PDIP8
(9.42x6.38, 2.54P)
CASE 646CM

MARKING DIAGRAM



Z	= Assembly Code
XY	= 2-digit Year & Week Code
KK	= 2-digit Die-Run Code
DM0x65RB	= Specific Device Code
x	= Device Option (2 or 3)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

FSDM0265RNB, FSDM0365RNB

ORDERING INFORMATION

Product Number	Package	Marking Code	V_{DSS}	f_{osc}	$R_{DS(ON)}$
FSDM0265RNB	8DIP	DM0265R	650 V	67 KHz	5.0 Ω
FSDM0365RNB	8DIP	DM0365R	650 V	67 KHz	3.6 Ω

Table 1. OUTPUT POWER TABLE

Product	230VAC \pm 15% (Note 3)		85–265VAC	
	Adapter (Note 1)	Open Frame (Note 2)	Adapter (Note 1)	Open Frame (Note 2)
FSDM0265RNB	16 W	27 W	13 W	20 W
FSDM0365RNB	19 W	30 W	16 W	24 W

1. Typical continuous power in a non-ventilated enclosed adapter with sufficient drain pattern as a heat sinker, at 50_C ambient.
2. Maximum practical continuous power in an open frame design with sufficient drain pattern as a heat sinker, at 50_C ambient.
3. 230 VAC or 100/115 VAC with doubler.

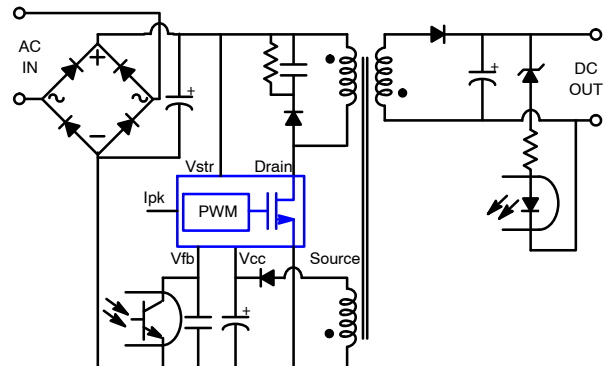


Figure 1. Typical Flyback Application

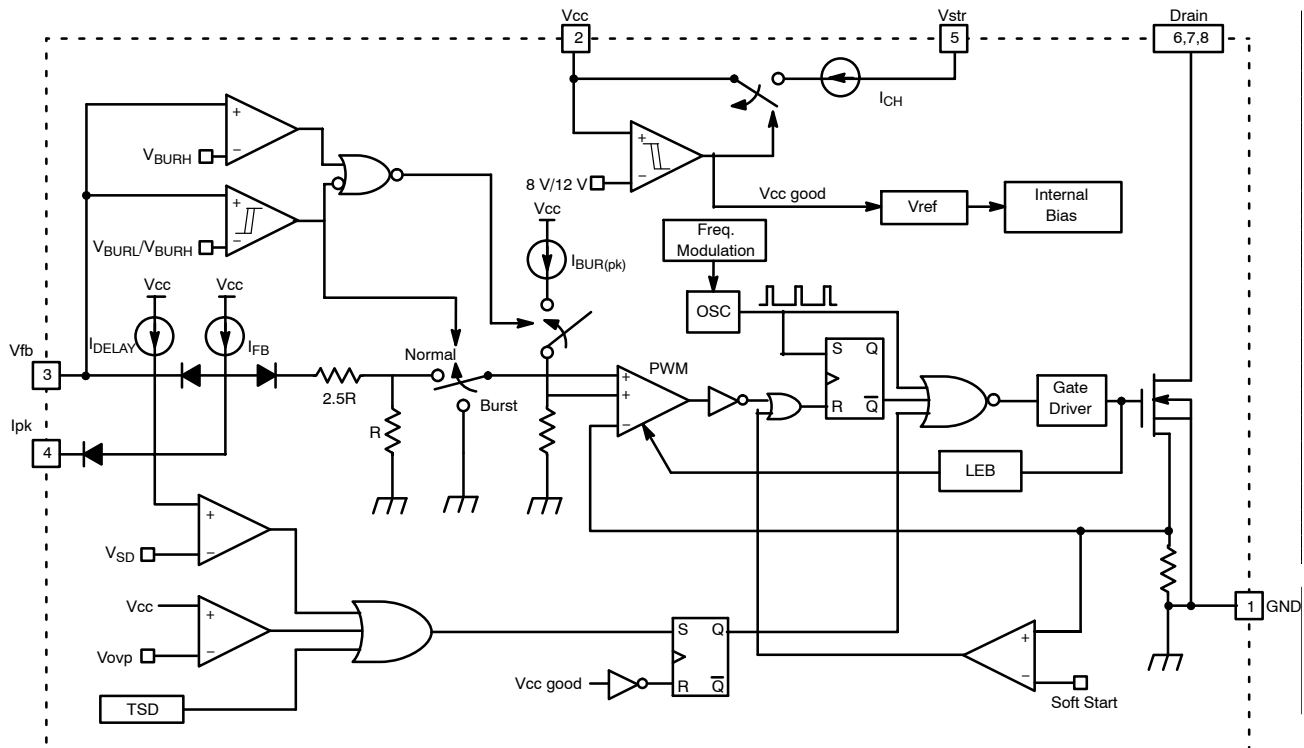


Figure 2. Functional Block Diagram of FSDM0265RNB

FSDM0265RNB, FSDM0365RNB

Table 2. PIN DEFINITIONS

Pin #	Pin Name	Pin Function Description
1	GND	SENSEFET source terminal on primary side and internal control ground.
2	Vcc	Positive supply voltage input. Although connected to an auxiliary transformer winding, current is supplied from pin 5 (Vstr) via an internal switch during startup (see Internal Block Diagram section). It is not until Vcc reaches the UVLO upper threshold (12 V) that the internal start-up switch opens and device power is supplied via the auxiliary transformer winding.
3	Vfb	The feedback voltage pin is the non-inverting input to the PWM comparator. It has a 0.9mA current source connected internally while a capacitor and optocoupler are typically connected externally. A feedback voltage of 6V triggers over load protection (OLP). There is a time delay while charging external capacitor Cfb from 3 V to 6 V using an internal 5uA current source. This time delay prevents false triggering under transient conditions, but still allows the protection mechanism to operate under true overload conditions.
4	lpk	This pin adjusts the peak current limit of the SENSEFET. The feedback 0.9 mA current source is diverted to the parallel combination of an internal 2.8kΩ resistor and any external resistor to GND on this pin to determine the peak current limit. If this pin is tied to Vcc or left floating, the typical peak current limit will be 1.5 A.
5	Vstr	This pin connects directly to the rectified AC line voltage source. At start up the internal switch supplies internal bias and charges an external storage capacitor placed between the Vcc pin and ground. Once the Vcc reaches 12 V, the internal switch is opened.
6	Drain	The drain pins are designed to connect directly to the primary lead of the transformer and are capable of switching a maximum of 650V. Minimizing the length of the trace connecting these pins to the transformer will decrease leakage inductance.

ABSOLUTE MAXIMUM RATINGS (Ta = 25°C, unless otherwise specified)

Symbol	Parameter		Ratings	Unit
V _{DRAIN}	Drain Pin Voltage		650	V
V _{STR}	Vstr Pin Voltage		650	V
I _{DM}	Drain Current Pulsed (Note 4)	FSDM0265RNB FSDM0365RNB	8.0 12	A
E _{AS}	Single Pulse Avalanche Energy (Note 5)	FSDM0265RNB FSDM0365RNB	68 127	mJ
V _{CC}	Supply Voltage		20	V
V _{FB}	Feedback Voltage Range		-0.3 to V _{CC}	V
P _D	Total Power Dissipation		1.56	W
T _J	Operating Junction Temperature		Internally limited	°C
T _A	Operating Ambient Temperature		-25 to +85	°C
T _{STG}	Storage Temperature		-55 to +150	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

4. Repetitive rating: Pulse width is limited by maximum junction temperature
5. L = 51 mH, T_J = 25°C.

THERMAL CHARACTERISTICS (Ta = 25°C, unless otherwise specified)

Symbol	Parameter		Ratings	Unit
8DIP				
θ _{JA}	Junction-to-Ambient Thermal (Note 6)	FSDM0265RNB FSDM0365RNB	79.64 85.74	°C/W
θ _{JC}	Junction-to-Case Thermal (Note 7) Junction-to-Case Thermal (Note 8)	FSDM0265RNB FSDM0365RNB	18.20 30.38	°C/W
ψ _{JT}	Junction-to-Top Thermal (Note 9)	FSDM0265RNB	34.30	°C/W

6. Free standing with no heatsink; without copper clad
7. Measured on the DRAIN pin close to plastic interface
8. Measured on the GND pin close to plastic interface
9. Measured on the PKG top surface

NOTE: All items are tested with the standards JESD 51-2 and 51-10 (DIP).

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ELECTRICAL CHARACTERISTICS (Ta = 25°C unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
SENSEFET SECTION						
IDSS	Zero-Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V	-	-	50	μA
		V _{DS} = 520 V, V _{GS} = 0 V, T _C = 125°C	-	-	200	μA
R _{DS(ON)}	Drain-Source On-State Resistance (Note 10)	V _{GS} = 10 V, I _D = 0.5 A FSDM0265RNB FSDM0365RNB	- -	5.0 3.6	6.0 4.5	Ω
C _{ISS}	Input Capacitance	FSDM0265RNB V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	-	550	-	pF
C _{OSS}	Output Capacitance		-	38	-	pF
C _{RSS}	Reverse Transfer Capacitance		-	17	-	pF
C _{ISS}	Input Capacitance	FSDM0365RNB V _{GS} = 0 V, V _{DS} = 25 V, f = 1 MHz	-	315	-	pF
C _{OSS}	Output Capacitance		-	47	-	pF
C _{RSS}	Reverse Transfer Capacitance		-	9.0	-	pF
t _{d(on)}	Turn-On Delay Time	FSDM0265RNB V _{DS} = 325 V, I _D = 1.0 A	-	20	-	ns
t _r	Rise Time		-	15	-	ns
t _{d(off)}	Turn-Off Delay Time		-	55	-	ns
t _f	Fall Time		-	25	-	ns
t _{d(on)}	Turn-On Delay Time	FSDM0365RNB V _{DS} = 325 V, I _D = 1.0 A	-	11.2	-	ns
t _r	Rise Time		-	34	-	ns
t _{d(off)}	Turn-Off Delay Time		-	28.2	-	ns
t _f	Fall Time		-	32	-	ns
CONTROL SECTION						
f _{OSC}	Switching Frequency		61	67	73	KHz
Δf _{MOD}	Switching Frequency Modulation		±1.5	±2.0	±2.5	KHz
Δf _{OSC}	Switching Frequency Variation (Note 11)	-25°C ≤ T _A ≤ 85°C	-	±5	±10	%
D _{MAX}	Maximum Duty Cycle	FSDM0265RNB FSDM0365RNB	62	67	72	%
			71	77	83	
D _{MIN}	Minimum Duty Cycle		0	0	0	%
V _{START}	UVLO Threshold Voltage	V _{FB} = GND	11	12	13	V
V _{STOP}		V _{FB} = GND	7	8	9	V
I _{FB}	Feedback Source Current	V _{FB} = GND	0.7	0.9	1.1	mA
t _{S/S}	Internal Soft Start Time	V _{FB} = 4 V	10	15	20	ms
BURST MODE SECTION						
V _{BURH}	Burst Mode Voltage	-	0.4	0.5	0.6	V
V _{BURL}		-	0.25	0.35	0.45	V
PROTECTION SECTION						
I _{LIM}	Peak Current Limit	Max. inductor current FSDM0265RNB FSDM0365RNB	1.3 1.89	1.5 2.15	1.7 2.41	A
t _{CLD}	Current Limit Delay Time (Note 12)		-	500	-	ns
T _{SD}	Thermal Shutdown Temperature		125	140	-	°C
V _{SD}	Shutdown Feedback Voltage		5.5	6.0	6.5	V
V _{OVP}	Over Voltage Protection	V _{FB} = 4 V	18	19	-	V
I _{DELAY}	Shutdown Delay Current		3.5	5.0	6.5	μA
t _{LEB}	Leading Edge Blanking Time		200	-	-	ns

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ELECTRICAL CHARACTERISTICS (Ta = 25°C unless otherwise noted) (continued)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
TOTAL DEVICE SECTION						
I _{OP}	Operating Supply Current (control part only)	V _{CC} = 14 V	1	3	5	mA
I _{CH}	Start-Up Charging Current	V _{CC} = 0 V	0.7	0.85	1.0	mA
V _{STR}	Vstr Supply Voltage	V _{CC} = 0 V	35	-	-	V

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

10. Pulse test: Pulse width ≤ 300us, duty ≤ 2%

11. These parameters, although guaranteed, are tested in EDS (wafer test) process

12. These parameters, although guaranteed, are not 100% tested in production

Table 3. COMPARISON BETWEEN KA5x0265RN AND FSDM0265RNB

Function	KA5x0265RN, KA5x0365RN	FSDM0x65RNB	FSDM0265RNB Advantage
Soft-Start	not applicable	15 ms	<ul style="list-style-type: none"> • Gradually increasing current limit during soft-start further reduces peak current and voltage stresses • Eliminates external components used for soft-start in most applications • Reduces or eliminates output overshoot
External Current Limit	not applicable	Programmable of default current limit	<ul style="list-style-type: none"> • Smaller transformer • Allows power limiting (constant over-load power) • Allows use of larger device for lower losses and higher efficiency
Frequency Modulation	not applicable	±2.0 KHz @67 KHz	<ul style="list-style-type: none"> • Reduces conducted EMI
Burst Mode Operation	not applicable	Built into controller	<ul style="list-style-type: none"> • Improves light load efficiency • Reduces power consumption at no-load • Transformer audible noise reduction
Drain Creepage at Package	1.02 mm	7.62 mm	<ul style="list-style-type: none"> • Greater immunity to arcing provoked by dust, debris and other contaminants

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Typical Performance Characteristics (Control Part)

(These characteristic graphs are normalized at $T_a = 25^\circ\text{C}$)

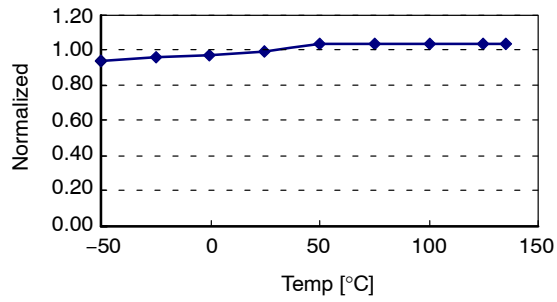


Figure 3. Operating Frequency (F_{osc}) vs. T_a

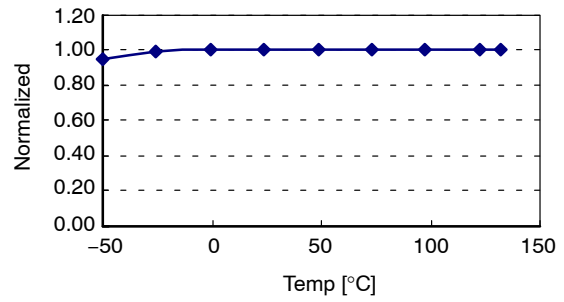


Figure 4. Frequency Modulation (ΔF_{MOD}) vs. T_a

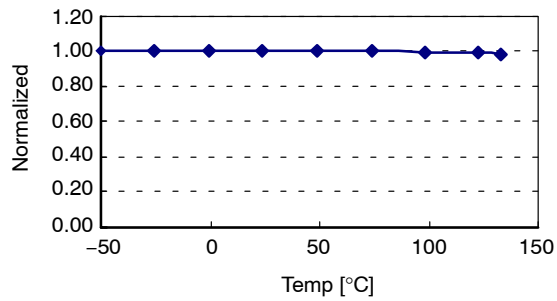


Figure 5. Maximum Duty Cycle (D_{MAX}) vs. T_a

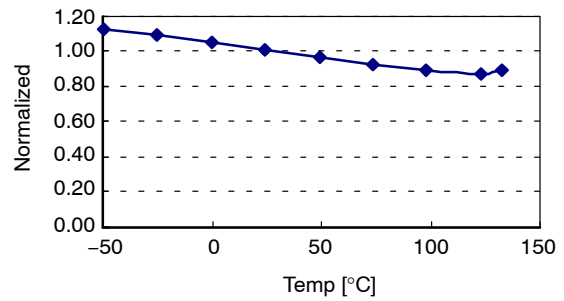


Figure 6. Operating Supply Current (I_{OP}) vs. T_a

FSDM0265RNB, FSDM0365RNB

Typical Performance Characteristics (Control Part) (continued)

(These characteristic graphs are normalized at $T_a = 25^\circ\text{C}$)

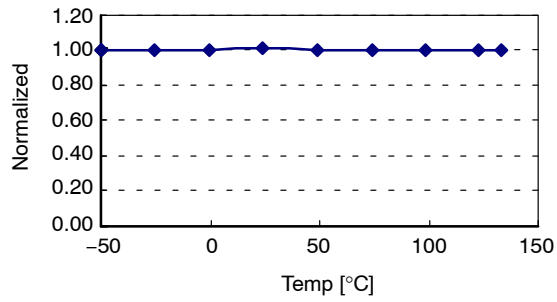


Figure 7. Start Threshold Voltage (V_{START}) vs. T_a

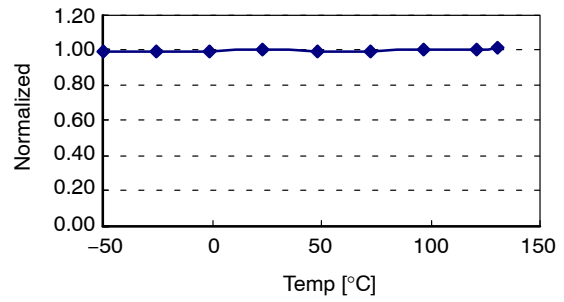


Figure 8. Stop Threshold Voltage (V_{STOP}) vs. T_a

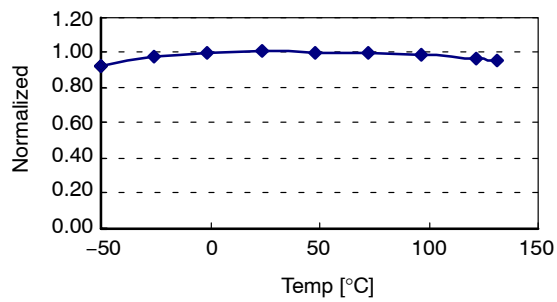


Figure 9. Feedback Source Current (I_{FB}) vs. T_a

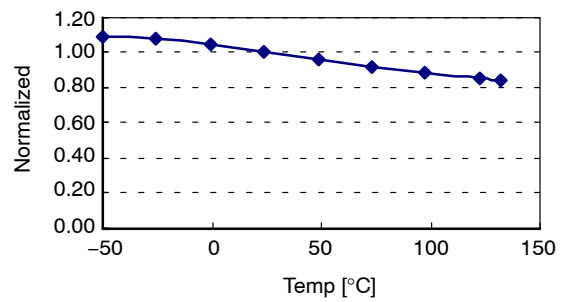


Figure 10. Start Up Charging Current (I_{CH}) vs. T_a

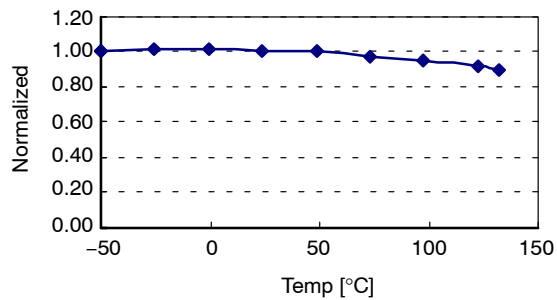


Figure 11. Peak Current Limit (I_{LIM}) vs. T_a

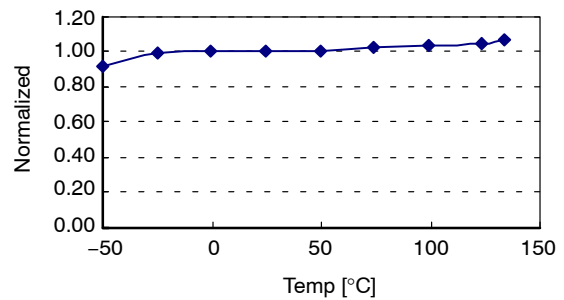


Figure 12. Burst Peak Current ($I_{BUR(pk)}$) vs. T_a

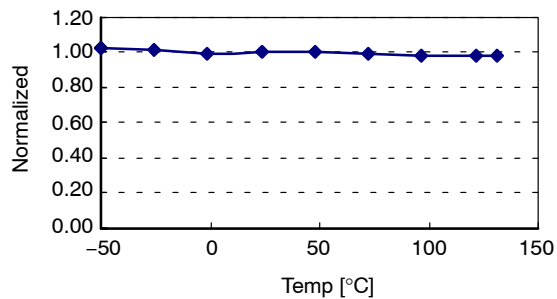


Figure 13. Over Voltage Protection (V_{OVP}) vs. T_a

FUNCTIONAL DESCRIPTION

Startup

In previous generations of Power Switches the Vstr pin had an external resistor to the DC input voltage line. In this generation the startup resistor is replaced by an internal high voltage current source and a switch that shuts off when 15 ms goes by after the supply voltage, Vcc, gets above 12 V. The source turns back on if Vcc drops below 8 V.

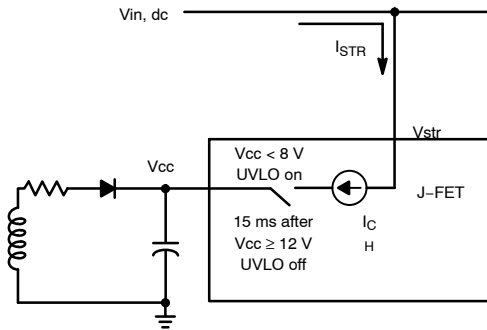


Figure 14. High Voltage Current Source

Feedback Control

The FSDM0x65RNB employs current mode control, as shown in Figure 15. An opto-coupler (such as the H11A817A) and shunt regulator (such as the KA431) are typically used to implement the feedback network. Comparing the feedback voltage with the voltage across the Rsense resistor plus an offset voltage makes it possible to control the switching duty cycle. When the KA431 reference pin voltage exceeds the internal reference voltage of 2.5 V, the optocoupler LED current increases, the feedback voltage Vfb is pulled down and it reduces the duty cycle. This event typically happens when the input voltage is increased or the output load is decreased.

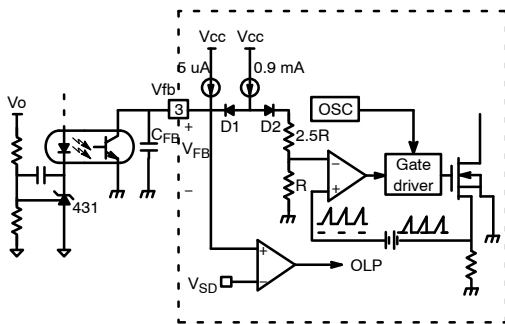


Figure 15. Pulse Width Modulation (PWM) Circuit

Leading Edge Blanking (LEB)

At the instant the internal SENSEFET is turned on, the primary side capacitance and secondary side rectifier diode reverse recovery typically cause a high current spike through the SENSEFET. Excessive voltage across the Rsense resistor leads to incorrect feedback operation in the current mode PWM control. To counter this effect, the power switch employs a leading edge blanking (LEB) circuit. This circuit inhibits the PWM comparator for a short time (t_{LEB}) after the SENSEFET is turned on.

Protection Circuits

The power switch has several protective functions such as over load protection (OLP), over voltage protection (OVP), under voltage lock out (UVLO) and thermal shutdown (TSD). Because these protection circuits are fully integrated inside the IC without external components, the reliability is improved without increasing cost. Once a fault condition occurs, switching is terminated and the SENSEFET remains off. This causes Vcc to fall. When Vcc reaches the UVLO stop voltage V_{STOP} (8 V), the protection is reset and the internal high voltage current source charges the Vcc capacitor via the Vstr pin. When Vcc reaches the UVLO start voltage V_{START} (12 V), the power switch resumes its normal operation. In this manner, the auto-restart can alternately enable and disable the switching of the power SENSEFET until the fault condition is eliminated.

Over Load Protection (OLP)

Overload is defined as the load current exceeding a pre-set level due to an unexpected event. In this situation, the protection circuit should be activated in order to protect the SMPS. However, even when the SMPS is operating normally, the over load protection (OLP) circuit can be activated during the load transition. In order to avoid this undesired operation, the OLP circuit is designed to be activated after a specified time to determine whether it is a transient situation or an overload situation. In conjunction with the Ipk current limit pin (if used) the current mode feedback path would limit the current in the SENSEFET when the maximum PWM duty cycle is attained. If the output consumes more than this maximum power, the output voltage (V_o) decreases below its rating voltage. This reduces the current through the opto-coupler LED, which also reduces the opto-coupler transistor current, thus increasing the feedback voltage (V_{FB}). If V_{FB} exceeds 3 V, the feedback input diode is blocked and the 5 uA current source (I_{DELAY}) starts to charge Cfb slowly up to Vcc. In this condition, V_{FB} increases until it reaches 6 V, when the switching operation is terminated as shown in Figure 16. The shutdown delay time is the time required to charge Cfb from 3 V to 6 V with 5 uA current source.

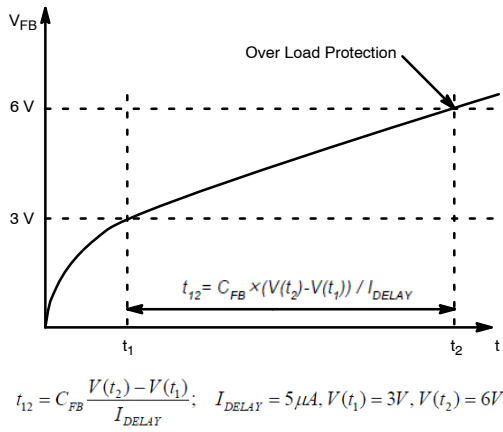


Figure 16. Over Load Protection (OLP)

Thermal Shutdown (TSD)

The SENSEFET and the control IC are integrated, making it easier for the control IC to detect the temperature of the SENSEFET. When the temperature exceeds approximately 140°C, thermal shutdown is activated.

Over Voltage Protection (OVP)

In the event of a malfunction in the secondary side feedback circuit, or an open feedback loop caused by a soldering defect, the current through the opto-coupler transistor becomes almost zero (refer to Figure 15). Then, V_{FB} climbs up in a similar manner to the over load situation, forcing the preset maximum current to be supplied to the SMPS until the over load protection is activated. Because excess energy is provided to the output, the output voltage may exceed the rated voltage before the over load protection is activated, resulting in the breakdown of the devices in the secondary side. In order to prevent this situation, an over voltage protection (OVP) circuit is employed. In general, V_{cc} is proportional to the output voltage and the power switch uses V_{cc} instead of directly monitoring the output voltage. If V_{CC} exceeds 19 V, OVP circuit is activated resulting in termination of the switching operation. In order to avoid undesired activation of OVP during normal operation, V_{cc} should be properly designed to be below 19 V.

Soft Start

The power switch has an internal soft start circuit that slowly increases the feedback voltage together with the SENSEFET current after it starts up. The typical soft start time is 15msec, as shown in Figure 17, where progressive increments of the SENSEFET current are allowed during the start-up phase. The pulse width to the power switching device is progressively increased to establish the correct working conditions for transformers, inductors, and capacitors. The voltage on the output capacitors is progressively increased with the intention of smoothly establishing the required output voltage. It also helps to prevent transformer saturation and reduce the stress on the secondary diode.

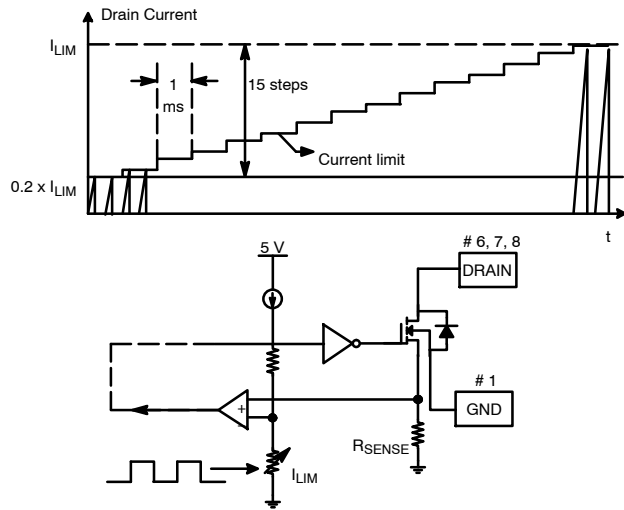


Figure 17. Soft Start Function

Burst Operation

In order to minimize power dissipation in standby mode, the power switch enters burst mode operation. As the load decreases, the feedback voltage decreases. As shown in Figure 18, the device automatically enters burst mode when the feedback voltage drops below V_{BURH} (500 mV). Switching still continues but the current limit is set to a fixed limit internally to minimize flux density in the transformer. The fixed current limit is larger than that defined by V_{FB} = V_{BURH} and therefore, V_{FB} is driven down further. Switching continues until the feedback voltage drops below V_{BURL} (350 mV). At this point switching stops and the output voltages start to drop at a rate dependent on the standby current load. This causes the feedback voltage to rise. Once it passes V_{BURH}, switching resumes. The feedback voltage then falls and the process repeats. Burst mode operation alternately enables and disables switching of the SENSEFET and reduces switching loss in Standby mode.

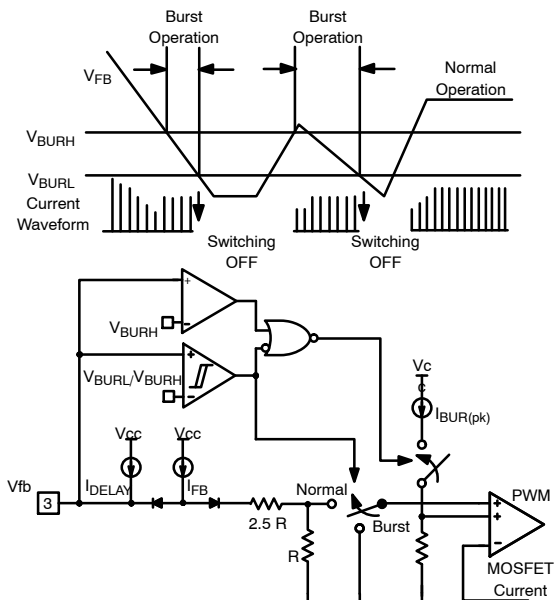


Figure 18. Soft Start Function

Frequency Modulation

Modulating the switching frequency of a switched power supply can reduce EMI. Frequency modulation can reduce EMI by spreading the energy over a wider frequency range than the bandwidth measured by the EMI test equipment. The amount of EMI reduction is directly related to the depth of the reference frequency. As can be seen in Figure 19, the frequency changes from 65 KHz to 69 KHz in 4 ms for the FSDM0x65RNB. Frequency modulation allows the use of a cost effective inductor instead of an AC input mode choke to satisfy the requirements of world wide EMI limits.

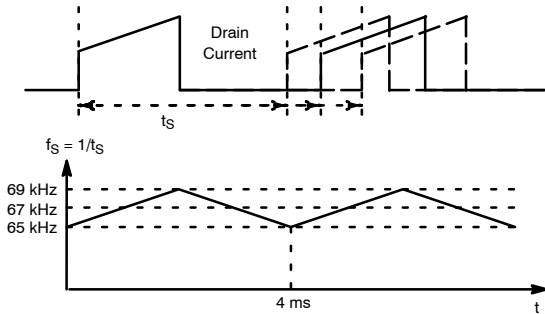


Figure 19. Frequency Modulation Waveform

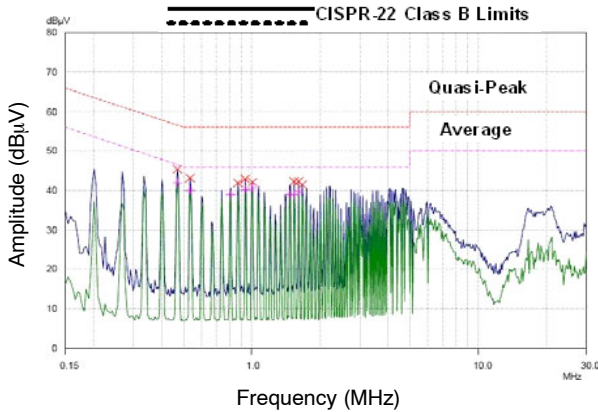


Figure 20. KA5-series Power Switch Full Range EMI scan (67 KHz, no Frequency Modulation) with DVD Player SET

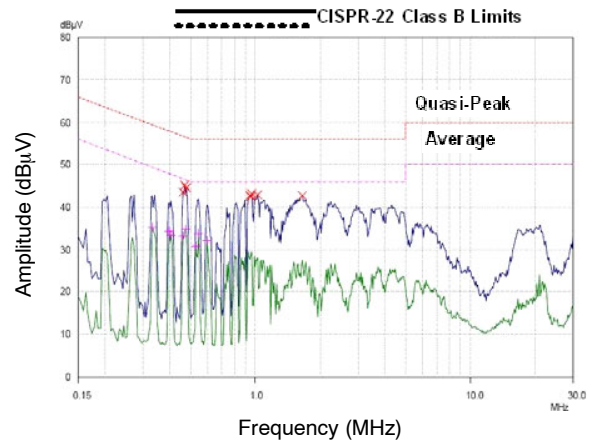


Figure 21. FSDM-series Power Switch Full Range EMI Scan (67 KHz, with Frequency Modulation) with DVD Player SET

Adjusting Peak Current Limit

As shown in Figure 22, a combined 2.8 kΩ internal resistance is connected to the non-inverting lead on the PWM comparator. A external resistance of Rx on the current limit pin forms a parallel resistance with the 2.8 kΩ when the internal diodes are biased by the main current source of 900 uA.

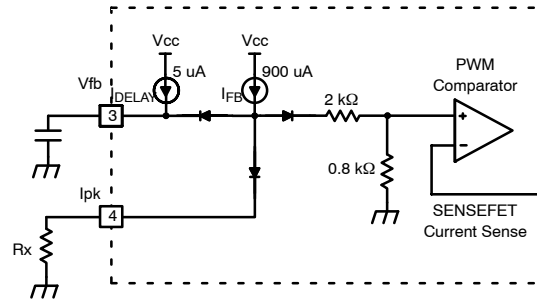


Figure 22. Peak Current Limit Adjustment

For example, FSDM0265RNB has a typical SENSEFET peak current limit (I_{LIM}) of 1.5 A. I_{LIM} can be adjusted to 1 A by inserting Rx between the Ipk pin and the ground. The value of the Rx can be estimated by the following equations:

$$1.5 \text{ A} : 1 \text{ A} = 2.8 \text{ k}\Omega : X \text{ k}\Omega \quad (\text{eq. 1})$$

$$X = R_x \parallel 2.8 \text{ k}\Omega \quad (\text{eq. 2})$$

(X represents the resistance of the parallel network)

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TYPICAL APPLICATION CIRCUIT

Table 4. ELECTRICAL SPECIFICATION

Application	Output Power	Input Voltage	Output Voltage (Max Current)
DVD Player	13 W	Universal Input (85–265 Vac)	3.3 V (0.8 A) 5.1 V (0.4 A) 12 V (0.3 A) 16 V (0.3 A)

Features

- High efficiency (> 76% at universal input)
- Low standby mode power consumption (< 1 W at 230 Vac input and 0.5 W load)
- Low component count
- Enhanced system reliability through various protection functions
- Low EMI through frequency modulation
- Internal soft-start (15 ms)

Key Design Notes

- The delay time for over load protection is designed to be about 30 ms with C106 of 47 nF. If faster/slower triggering of OLP is required, C106 can be changed to a smaller/larger value (eg. 100 nF for about 60 ms).
- Using a resistor R104 (3.3 Ω) on Ipk pin (#4), the pulse-by-pulse peak current limit level (I_{LIM}) is adjusted to about 0.8 A.
- The branch formed by D103, C108 and R106 provides another I_{LIM} adjustment having a negative slope to the input voltage. The I_{LIM} value decreases as the input voltage level increases.

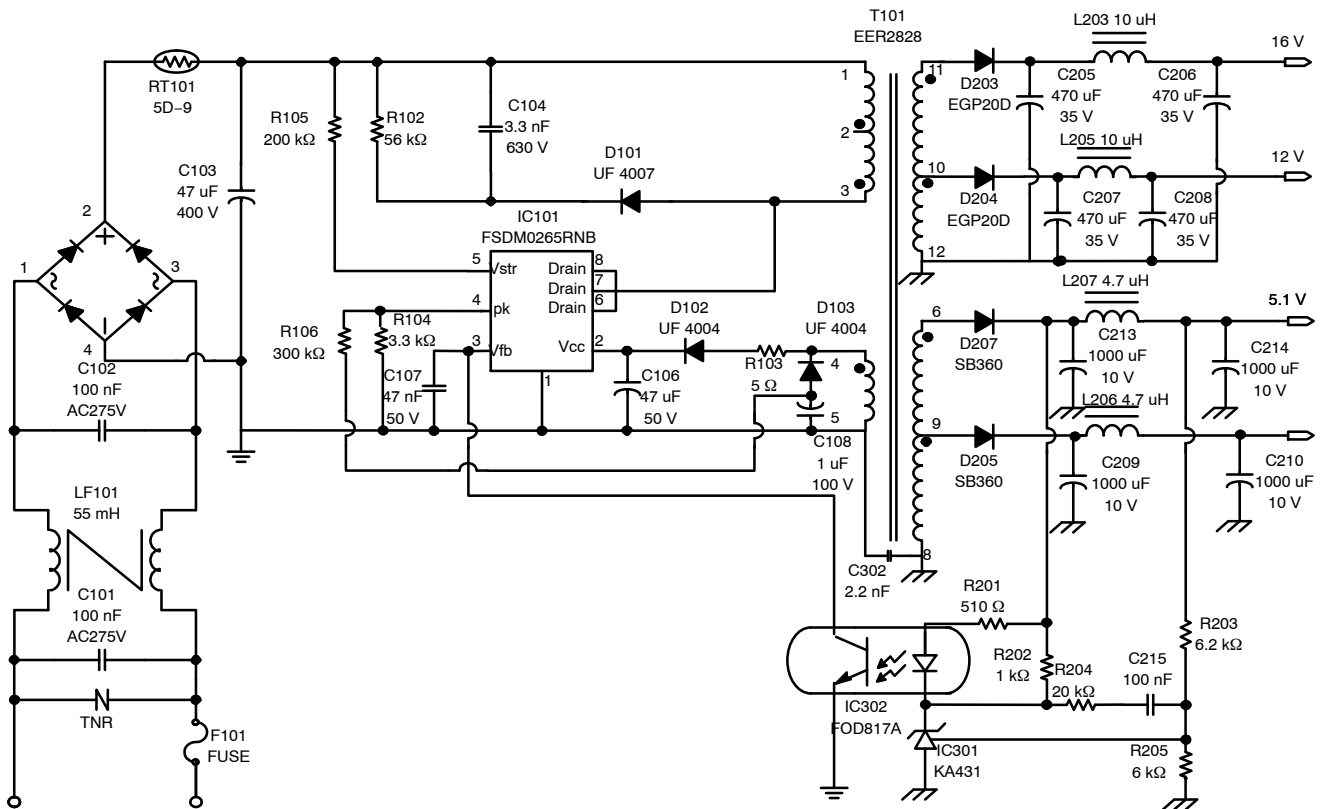


Figure 23. Schematic

FSDM0265RNB, FSDM0365RNB

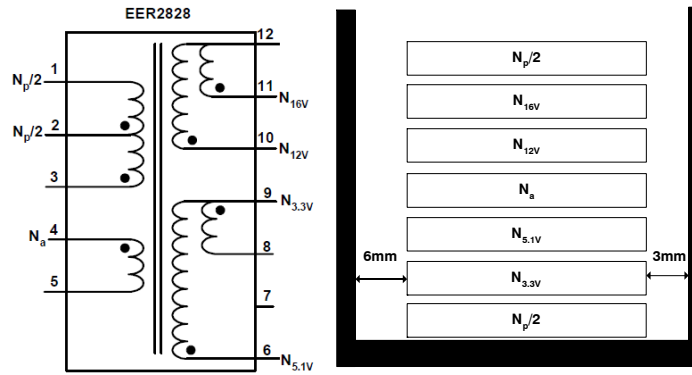


Figure 24. Transformer Schematic Diagram

Table 5. WINDING SPECIFICATION

	Pin (S→F)	Wire	Turns	Winding Method
$N_p/2$	3→2	0.25 $\phi \times 1$	50	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				
$N_{3.3V}$	9→8	0.33 $\phi \times 2$	4	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				
$N_{5.1V}$	6→9	0.33 $\phi \times 1$	2	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				
N_a	4→5	0.25 $\phi \times 1$	16	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				
N_{12V}	10→12	0.33 $\phi \times 1$	14	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 3 Layers				
N_{16V}	11→12	0.33 $\phi \times 1$	18	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				
$N_p/2$	2→1	0.25 $\phi \times 1$	50	Center Solenoid Winding
Insulation: Polyester Tape t = 0.050 mm, 2 Layers				

Table 6. ELECTRICAL CHARACTERISTICS

	Pin	Spec.	Remark
Inductance	1-3	1.4 mH \pm 10%	100 kHz, 1 V
Leakage	1-3	25 μ H Max.	Short all other pins

Core & Bobbin

Core: EER2828 ($A_e = 86.66 \text{ mm}^2$)

Bobbin: EER2828

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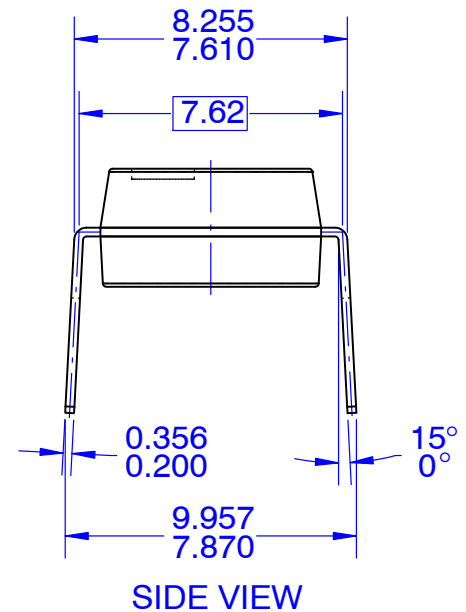
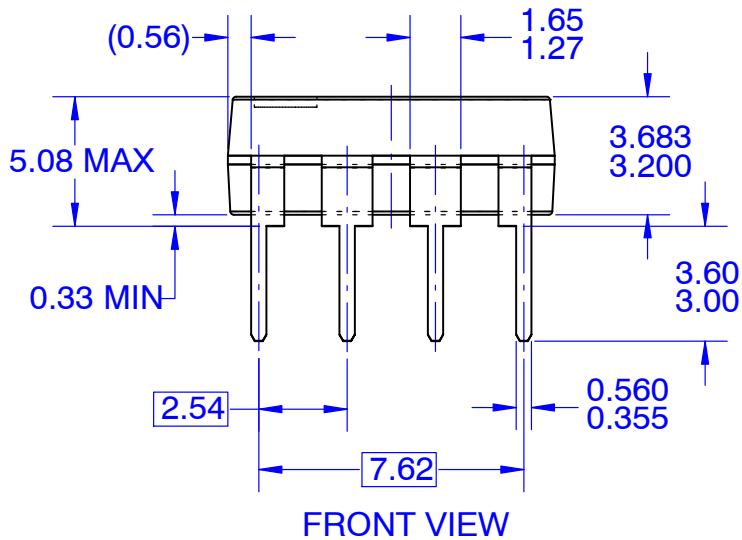
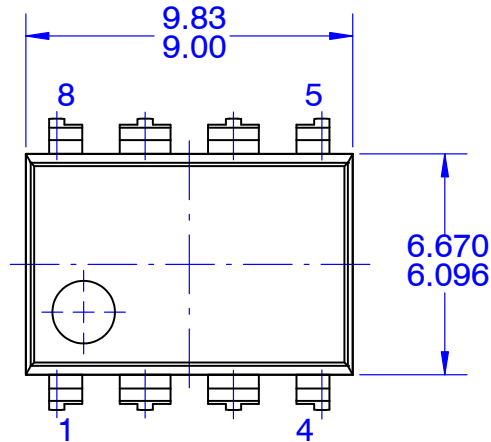
Table 7. DEMO CIRCUIT PART LIST

Part	Value	Note	Part	Value	Note
Resistor			Inductor		
R102	56 K	1 W	L203	10 uH	-
R103	5	1/4 W	L205	10 uH	-
R104	3.3 K	1/4 W	L206	4.7 uH	-
R105	200 K	1/4 W	L207	4.7 uH	-
R106	300 K	1/4 W	Diode		
R201	510	1/4 W	D101	UF4007	PN Ultra Fast
R202	1 K	1/4 W	D102	UF4004	PN Ultra Fast
R203	6.2 K	1/4 W	D103	UF4004	PN Ultra Fast
R204	20 K	1/4 W	D203	EGP20D	PN Ultra Fast
R205	6 K	1/4 W	D204	EGP20D	PN Ultra Fast
Capacitor			D205	SB360	Schottky
C101	100 nF/275 AC	Box	D207	SB360	Schottky
C102	100 nF/275 AC	Box	IC		
C103	47 uF/400 V	Electrolytic	IC101	FSDM0265RNB	Power Switch
C104	3.3 nF/630 V	Film	IC301	KA431 (TL431)	Voltage reference
C106	47 uF/50 V	Electrolytic	IC302	FOD817A	Opto-Coupler
C107	47 nF/50 V	Ceramic			
C108	1 uF/100 V	Electrolytic	Fuse		
C205	470 uF/35 V	Electrolytic	FUSE	2 A/250 V	
C206	470 uF/35 V	Electrolytic			
C207	470 uF/35 V	Electrolytic	NTC		
C208	470 uF/35 V	Electrolytic	RT101	5D-9	
C209	1000 uF/10 V	Electrolytic			
C210	1000 uF/10 V	Electrolytic	Bridge Diode		
C213	1000 uF/10 V	Electrolytic	BD101	2KBP06M 2N257	Bridge Diode
C214	1000 uF/10 V	Electrolytic			
C215	100 nF/50 V	Ceramic	Line Filter		
C302	2.2 nF	AC Ceramic	LF101	55 mH	-

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PACKAGE DIMENSIONS

PDIP8 9.42x6.38, 2.54P
CASE 646CM
ISSUE O




NOTES:

- A. CONFORMS TO JEDEC MS-001, VARIATION BA
- B. ALL DIMENSIONS ARE IN MILLIMETERS
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS
- D. DIMENSIONS AND TOLERANCES PER ASME Y14.5M-2009

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