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Internal Block Diagram

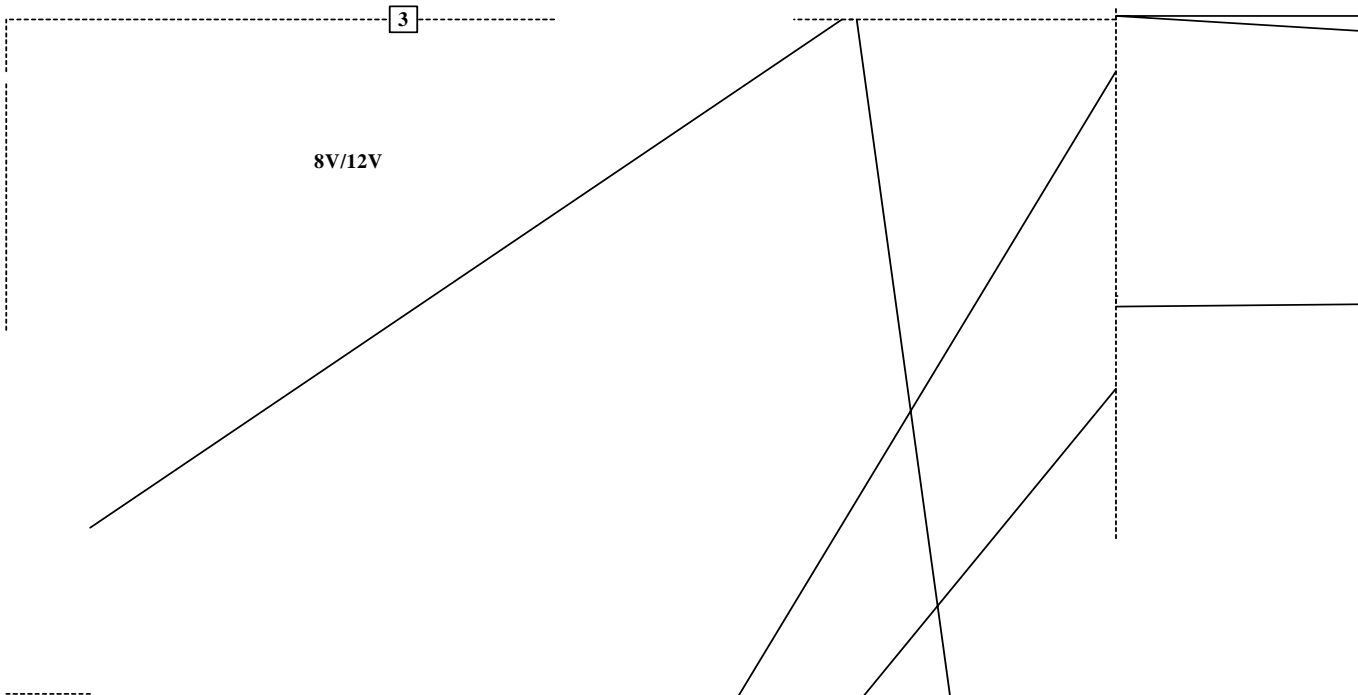


Figure 2. Functional Block Diagram of FSDM07652R

Pin Definitions

Pin Number	Pin Name	Pin Function Description
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Pin Configuration

Figure 3. Pin Configuration (Top View)

Absolute Maximum Ratings

(Ta=25°C, unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-source voltage	V _{DSS}	650	V
V _{str} Max Voltage	V _{STR}	650	V
Pulsed Drain current (T _c =25°C) ⁽¹⁾	I _{DM}	15	ADC
Continuous Drain Current(T _c =25°C)	I _D	3.8	A
Continuous Drain Current(T _c =100°C)	I _D	2.4	A
Single pulsed avalanche energy ⁽²⁾	E _{AS}	370	mJ
Single pulsed avalanche current ⁽³⁾	I _{AS}	-	A
Supply voltage	V _{CC}	20	V
Input voltage range	V _{FB}	-0.3 to V _{CC}	V
Total power dissipation(T _c =25°C)	P _D (Watt H/S)	45	W
Operating junction temperature	T _j	Internally limited	°C
Operating ambient temperature	T _A	-25 to +85	°C
Storage temperature range	T _{STG}	-55 to +150	°C
ESD Capability, HBM Model (All pins excepts for V _{str} and V _{fb})	-	2.0 (GND-V _{str} /V _{fb} =1.5kV)	kV
ESD Capability, Machine Model (All pins excepts for V _{str} and V _{fb})	-	300 (GND-V _{str} /V _{fb} =225V)	V

Notes:

1. Repetitive rating: Pulse width limited by maximum junction temperature
2. L=14mH, starting T_j=25°C
3. L=13uH, starting T_j=25°C

Thermal Impedance

Parameter	Symbol	Value	Unit
Junction-to-Ambient Thermal	θ _{JA} ⁽¹⁾	49.90	°C/W
Junction-to-Case Thermal	θ _{JC} ⁽²⁾	2.78	°C/W

Notes:

1. Free standing with no heat-sink under natural convection.
2. Infinite cooling condition - Refer to the SEMI G30-88.

Electrical Characteristics

(Ta = 25°C unless otherwise specified)

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
Sense FET SECTION						
Drain source breakdown voltage	BVDSS	VGS = 0V, ID = 250μA	650	-	-	V
		VDS = 650V, VGS = 0V	-	-	50	μA
Zero gate voltage drain current	IDSS	VDS = 520V				

Shutdown delay current	I _{DELAY}	V _{FB} =5V	2.8	3.5	4.2	μA
TOTAL DEVICE SECTION						
Operating supply current ⁽⁵⁾	I _{OP}	V _{FB} =GND, V _{CC} =14V	-	2.5	5	mA
	I _{OP} (MIN)	V _{FB} =GND, V _{CC} =10V				
	I _{OP} (MAX)	V _{FB} =GND, V _{CC} =18V				

Notes:

1. Pulse test : Pulse width $\leq 300\mu\text{S}$, duty $\leq 2\%$
2. These parameters, although guaranteed at the design, are not tested in mass production.
3. These parameters, although guaranteed, are tested in EDS(wafer test) process.
4. These parameters indicate the inductor current.
5. This parameter is the current flowing into the control IC.

Comparison Between FS6M07652RTC and FSDM07652R

Function	FS6M07652RTC	FSDM07652R	FSDM07652R Advantages
Soft-Start	Adjustable soft-start time using an external capacitor	Internal soft-start with typically 10ms (fixed)	<ul style="list-style-type: none">• Gradually increasing current limit during soft-start further reduces peak current and voltage component stresses• Eliminates external components used for soft-start in most applications• Reduces or eliminates output overshoot
Burst Mode Operation	<ul style="list-style-type: none">• Built into controller• Output voltage drops to around half	<ul style="list-style-type: none">• Built into controller• Output voltage fixed	<ul style="list-style-type: none">• Improve light load efficiency• Reduces no-load consumption

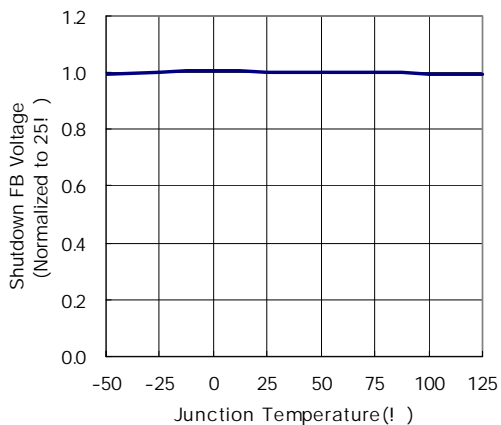
Typical Performance Characteristics

(These Characteristic Graphs are Normalized at $T_a = 25^\circ\text{C}$)

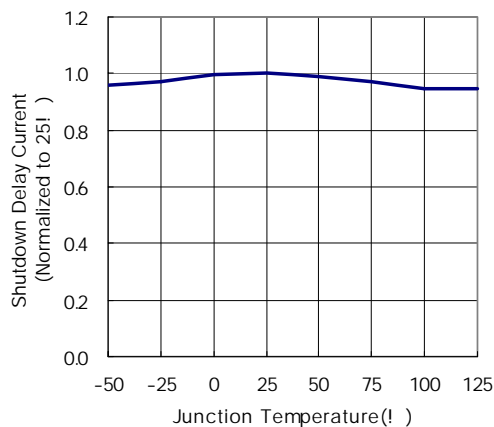
Operating Current vs. Temp

Typical Performance Characteristics (Continued)

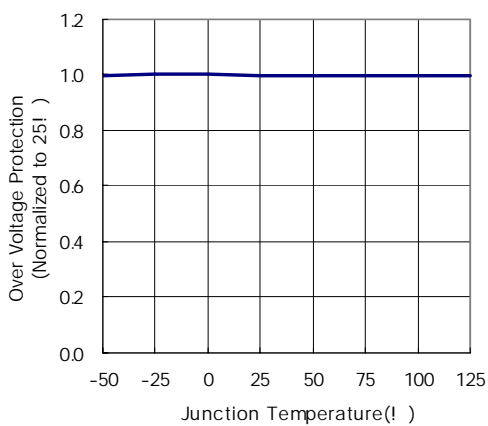
(These Characteristic Graphs are Normalized at Ta= 25°C)



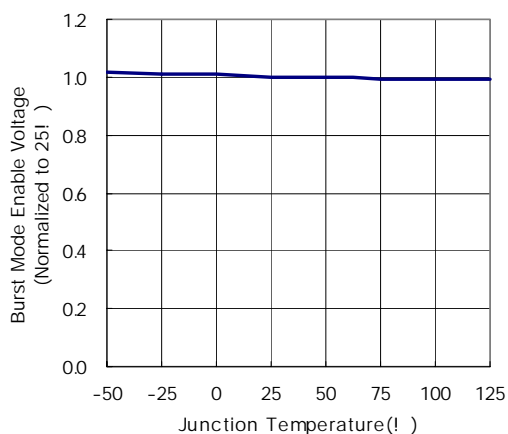
ShutDown Feedback Voltage vs. Temp



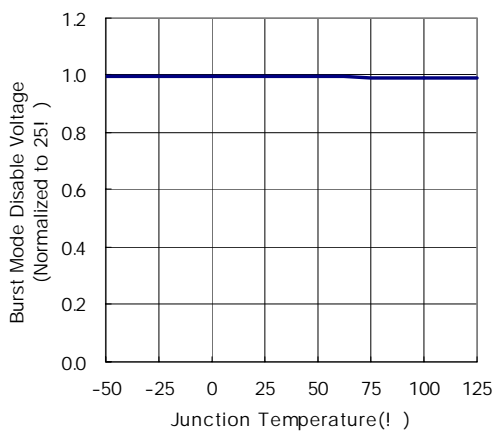
ShutDown Delay Current vs. Temp



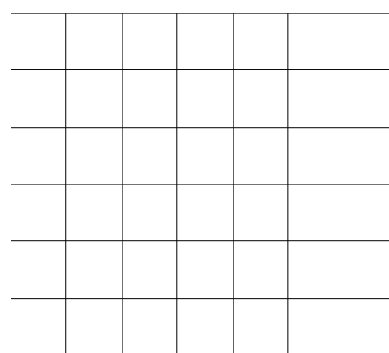
Over Voltage Protection vs. Temp



Burst Mode Enable Voltage vs. Temp



Burst Mode Disable Voltage vs. Temp



Current Limit vs. Temp

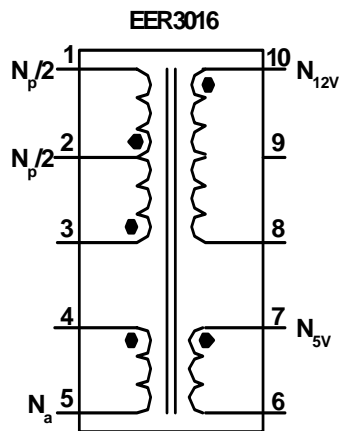
Typical Performance Characteristics (Continued)

(These Characteristic Graphs are Normalized at $T_a = 25^\circ\text{C}$)

Soft Start Time vs. Temp

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 FPSTM uses V_{cc} instead of directly monitoring the output voltage. If V_{CC} exceeds 19V, an OVP circuit is activated resulting in the termination of the

2. Transformer Schematic Diagram



3. Winding Specification

No	Pin (s→f)	Wire	Turns	Winding Method
Na	4 → 5	0.2 ^φ × 1	8	Center Winding
Insulation: Polyester Tape t = 0.050mm, 2Layers				
Np/2	2 → 1	0.4 ^φ × 1	18	Solenoid Winding
Insulation: Polyester Tape t = 0.050mm, 2Layers				
N12v	10 → 8	0.3 ^φ × 3	7	Center Winding
Insulation: Polyester Tape t = 0.050mm, 2Layers				
N5v	7 → 6	0.3 ^φ × 3	3	Center Winding
Insulation: Polyester Tape t = 0.050mm, 2Layers				
Np/2	3 → 2	0.4 ^φ × 1	18	Solenoid Winding
Outer Insulation: Polyester Tape t = 0.050mm, 2Layers				

4. Electrical Characteristics

	Pin	Specification	Remarks
Inductance	1 - 3	520uH ± 10%	100kHz, 1V
Leakage Inductance	1 - 3	10uH Max	2 nd all short

5. Core & Bobbin

Core : EER 3016

Bobbin : EER3016

Ae(mm²) : 96

6.Demo Circuit Part List

7. Layout

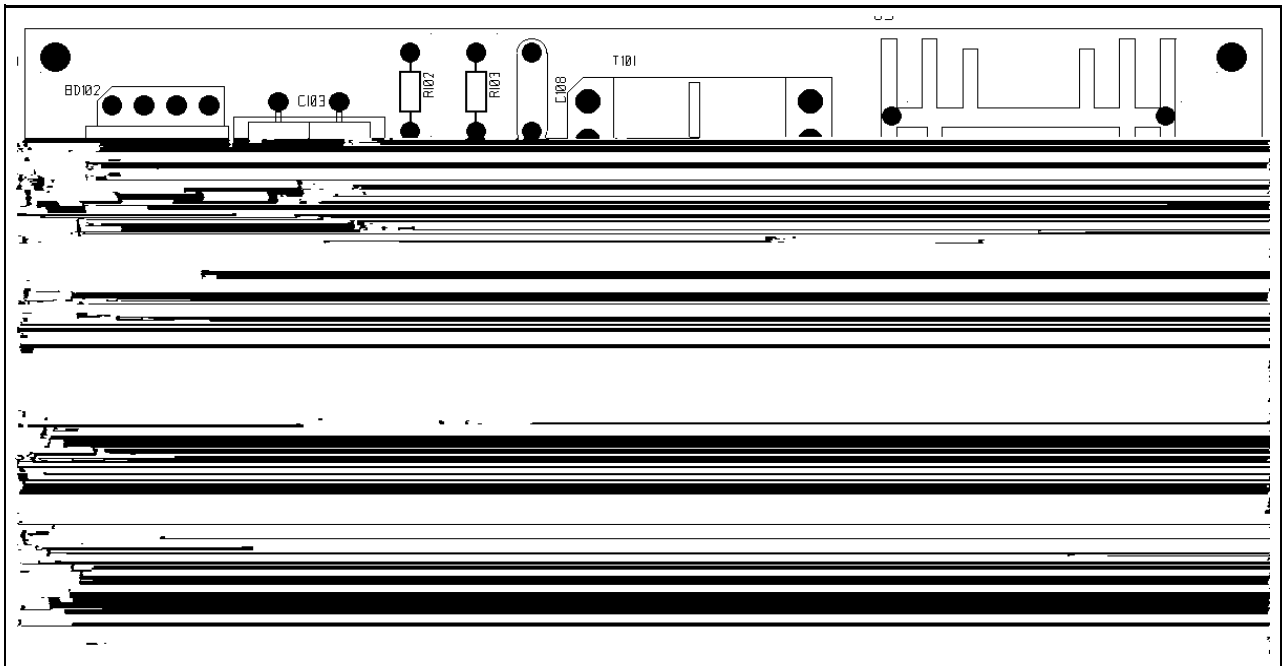


Figure 10. Layout Considerations for FSDM07652R

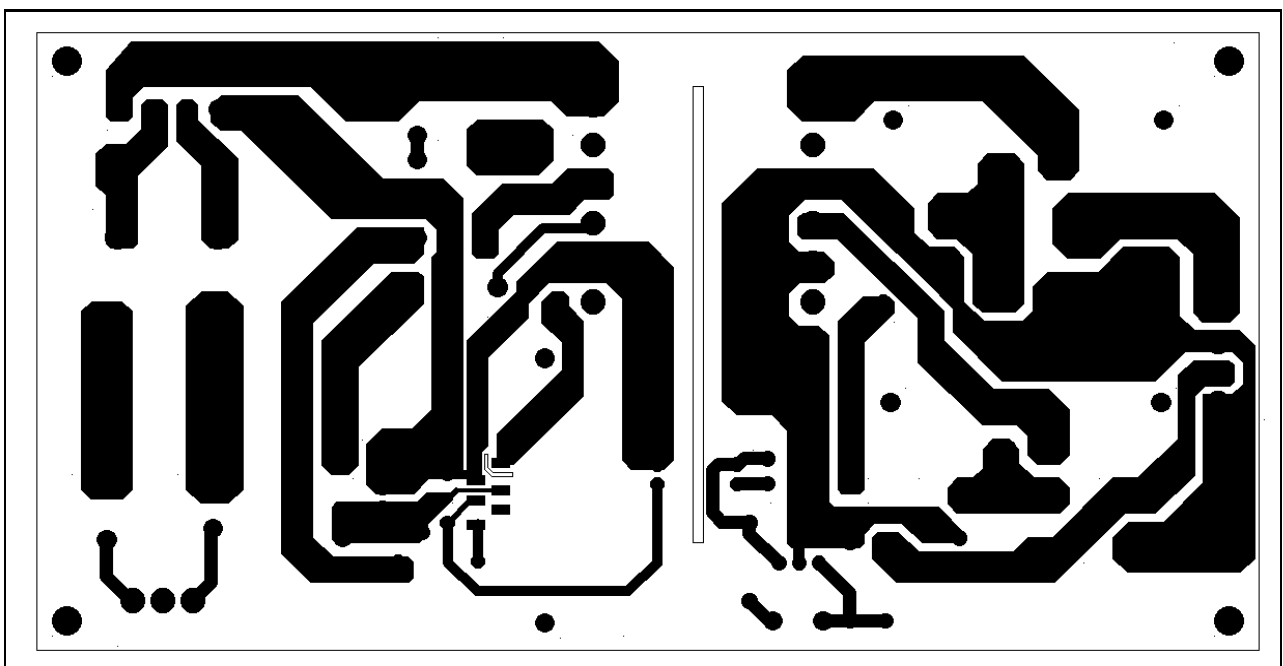


Figure 11. Layout Considerations for FSDM07652R

Ordering Information

Product Number	Package	Marking Code	BVdss	Rds(on)Max.
FSDM07652RWDTU	TO-220F-6L(Forming)	DM07652R	650V	1.6 Ω

WDTU : Forming Type

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