H-Bridge in APM16 Series for LLC and Phase-shifted DC-DC Converter

FAM65HR51DS2

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Features

- SIP or DIP H−Bridge Power Module for On−board Charger (OBC) in EV or PHEV
- 5 kV/1 sec Electrically Isolated Substrate for Easy Assembly
- Creepage and Clearance per IEC60664−1, IEC 60950−1
- Compact Design for Low Total Module Resistance
- Module Serialization for Full Traceability
- Lead Free, RoHS and UL94V−0 Compliant
- Automotive Qualified per AEC Q101 and AQG324 Guidelines

Applications

- DC−DC Converter for On−board Charger in EV or PHEV

Benefits

- Enable Design of Small, Efficient and Reliable System for Reduced Vehicle Fuel Consumption and CO_2 Emission
- Simplified Assembly, Optimized Layout, High Level of Integration, and Improved Thermal Performance

APMCA−B16
16 LEAD
CASE MODGJ

ORDERING INFORMATION

See detailed ordering, marking and shipping information on page 2 of this data sheet.

ORDERING INFORMATION

Part Number	Package	Lead Forming	Snubber Capacitor Inside	DBC Material	Pb−Free and RoHS Compliant	Operating Temperature (T_A)	Packing Method
FAM65HR51DS2	APM16−CAB	L−Shape	Yes	Al_2O_3	Yes		

FAM65HR51DS2

Table 4. ELECTRICAL SPECIFICATIONS (T_J = 25°C, Unless Otherwise Specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain−to−Source Breakdown Voltage	I_D = 1 mA, V_{GS} = 0 V	650	−	−	V
$V_{GS(th)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 3.3 mA	3.0	−	5.0	V
$R_{DS(ON)}$	Q1 – Q4 MOSFET On Resistance	V_{GS} = 10 V, I_D = 20 A	−	44	51	mΩ
$R_{DS(ON)}$	Q1 – Q4 MOSFET On Resistance	V_{GS} = 10 V, I_D = 20 A, T_J = 125°C (Note 4)	−	79	−	mΩ
g_{FS}	Forward Transconductance	V_{DS} = 20 V, I_D = 20 A (Note 4)	−	30	−	S
I_{GSS}	Gate−to−Source Leakage Current	V_{GS} = ±20 V, V_{DS} = 0 V	−100	−	+100	nA
I_{DSS}	Drain−to−Source Leakage Current	V_{DS} = 650 V, V_{GS} = 0 V	−	−	10	μA
DYNAMIC CHARACTERISTICS (Note 4)						
C_{iss}	Input Capacitance	V_{DS} = 400 V V_{GS} = 0 V f = 1 MHz	−	4864	−	pF
C_{oss}	Output Capacitance		−	109	−	pF
C_{rss}	Reverse Transfer Capacitance		−	16	−	pF
$C_{oss(eff)}$	Effective Output Capacitance	V_{DS} = 0 to 520 V V_{GS} = 0 V	−	652	−	pF
R_g	Gate Resistance	f = 1 MHz	−	2	−	Ω
$Q_{g(tot)}$	Total Gate Charge	V_{DS} = 380 V I_D = 20 A V_{GS} = 0 to 10 V	−	123	−	nC
Q						

PARAMETER DEFINITIONS

Reference to Table 4: Parameter of Electrical Specifications

BV_{DSS}	Q1 – Q4 MOSFET Drain−to−

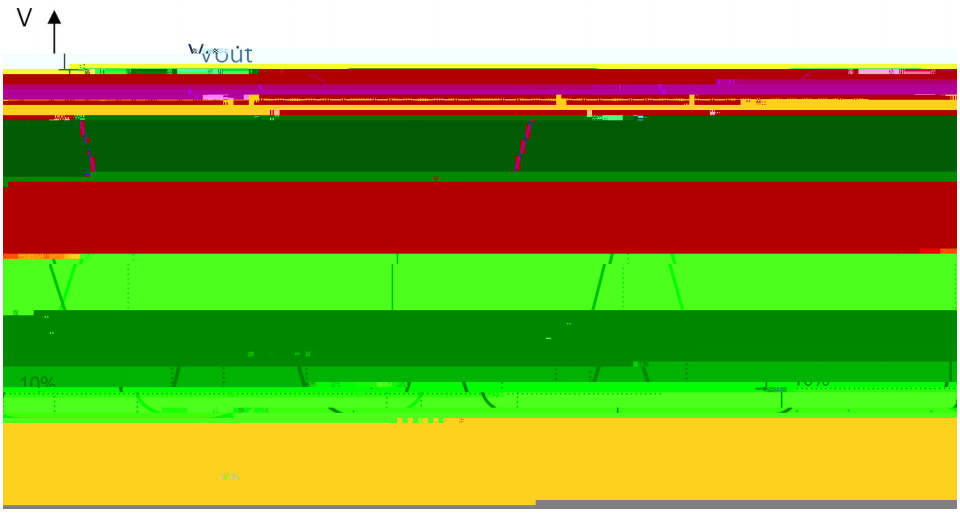

Figure 3. Timing Measurement Variable Definition

Table 7. PARAMETER OF SWITCHING CHARACTERISTICS

Turn−On Delay ($t_{d(on)}$)	This is the time needed to charge the input capacitance, Ciss, before the load current ID starts flowing. The measurement conditions are described in the Table 4. For signal definition please check Figure 3 above.
Rise Time (t_r)	The rise time is the time to discharge output capacitance, Coss. After that time the MOSFET conducts the given load current ID. The measurement conditions are described in the Table 4. For signal definition please check Figure 3 above.
Turn−On Time (t_{on})	Is the sum of turn−on−delay and rise time
Turn−Off Delay ($t_{d(off)}$)	td(off) is the time to discharge Ciss after the MOSFET is turned off. During this time the load current ID is still flowing The measurement conditions are described in the Table 4. For signal definition please check Figure 3 above.
Fall Time (t_f)	The fall time, tf, is the time to charge the output capacitance, Coss. During this time the load current drops down and the voltage VDS

TYPICAL CHARACTERISTICS

TYPICAL CHARACTERISTICS

V

Figure 10. On−Resistance vs. Gate−to−Source Voltage

Figure 11. $R_{DS(norm)}$ vs. Junction Temperature

PIM16 40.10x21.90x4.50
CASE MODGJ
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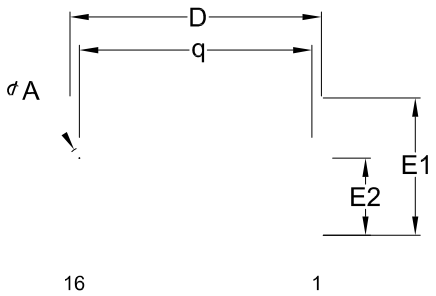

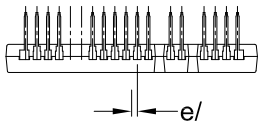

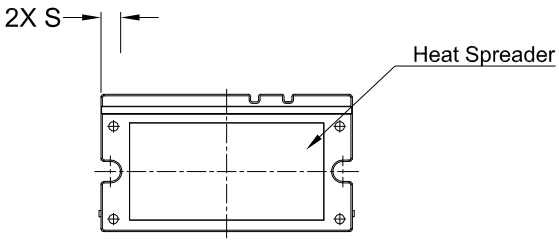

GENERIC
MARKING DIAGRAM*

XXXXXXXXXXXXXXXX
ZZZ ATYWW
NNNNNNN

XXXX = Specific Device Code
ZZZ = Lot ID
AT = Assembly & Test Location
Y = Year
W = Work Week
NNN = Serial Number

*This information is generic. Please refer to device data sheet for actual part marking. Pb Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.