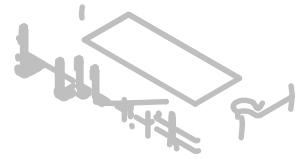


**B**

**C**

**S a**



# FAM65CR51AXZ1, FAM65CR51AXZ2

## ORDERING INFORMATION

Part Number	Package	Lead Forming	DBC Material	Pb-Free and RoHS Compliant	Operating Temperature (T <sub>A</sub> )	Packing Method
FAM65CR51AXZ1	APM16-CDA	Y-Shape	ALN	Yes	-40°C ~ 125°C	Tube
FAM65CR51AXZ2	APM16-CDB	L-Shape	ALN	Yes	-40°C ~ 125°C	Tube

## Pin Configuration and Description



Figure 1. Pin Configuration

Table 1. PIN DESCRIPTION

Pin Number	Pin Name	Pin Description
1, 2	AC1	Phase 1 Leg of the PFC Bridge
3	NC	Not Connected
4	NC	Not Connected
5, 6	B+	Positive Battery Terminal
7, 8	Q1 Source	Source Terminal of Q1
9	Q1 Gate	Gate Terminal of Q1
10	Q2 Gate	Gate Terminal of Q2
11, 12	Q2 Source	Source Terminal of Q2
13	NC	Not Connected
14	NC	Not Connected
15, 16	AC2	Phase 2 Leg of the PFC Bridge

# FAM65CR51AXZ1, FAM65CR51AXZ2

## INTERNAL EQUIVALENT CIRCUIT

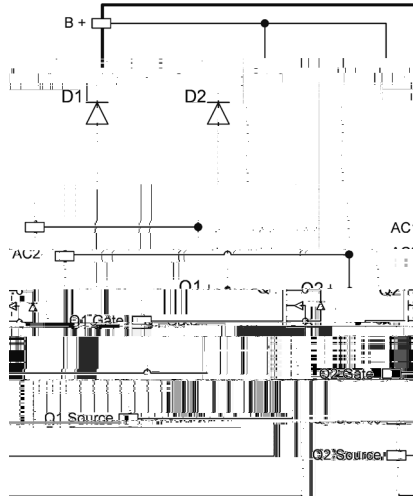


Figure 2. Internal Block Diagram

Table 2. ABSOLUTE MAXIMUM RATINGS OF MOSFET ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)

Symbol	Parameter	Max	Unit
$V_{DS}$ (Q1~Q2)	Drain-to-		

# FAM65CR51AXZ1, FAM65CR51AXZ2

**Table 3. ELECTRICAL SPECIFICATIONS OF MOSFET** ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain-to-					

## FAM65CR51AXZ1, FAM65CR51AXZ2

**Table 4. ABSOLUTE MAXIMUM RATINGS OF THE BOOST DIODE** ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)

Symbol	Parameter	Rating	Unit
$V_{RRM}$	Peak Repetitive Reverse Voltage (Note 4)	650	V
$E_{AS}$	Avalanche Energy (17 A, 1 mH)	144	mJ
$I_F$	Continuous Rectified Forward Current, $T_C < 148^\circ\text{C}$	30	A
$I_{F,MAX}$	Non-Repetitive Forward Surge Current, $T_C = 25^\circ\text{C}$ , 10 $\mu\text{s}$	1100	A
$I_{F,MAX}$	Non-Repetitive Forward Surge Current, $T_C = 150^\circ\text{C}$ , 10 $\mu\text{s}$	1000	A
$I_{FSM}$	Non-Repetitive Peak Surge Current (Sine Half Wave, $T_p = 8.3$ ms)	110	A
$P_D$	Power Dissipation ( $T_C = 25^\circ\text{C}$ )	166	W
$T_J$	Maximum Junction Temperature	-55 to +175	$^\circ\text{C}$
$T_C$	Maximum Case Temperature	-40 to +125	$^\circ\text{C}$
$T_{STG}$	Storage Temperature	-40 to +125	$^\circ\text{C}$

4.  $V_{RRM}$  and  $I_F$  value referenced to TO220-2L Auto Qualified Package Device FFSP3065B\_F085

**Table 5. ELECTRICAL SPECIFICATIONS OF THE BOOST DIODE** ( $T_J = 25^\circ\text{C}$ , Unless Otherwise Specified)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
$V_{DC}$	DC Blocking Voltage	$I_R = 200 \mu\text{A}$	$T_C = 25^\circ\text{C}$	650	-	-	V
$V_F$	Instantaneous Forward Voltage	$I_F = 30$ A	$T_C = 25^\circ\text{C}$	-	1.38	1.7	V
			$T_C = 125^\circ\text{C}$	-	1.6	2.0	V
			$T_C = 175^\circ\text{C}$	-	1.72	2.4	V
$I_R$	Instantaneous Reverse Current	$V_R = 650$ V	$T_C = 25^\circ\text{C}$	-	0.5	40	$\mu\text{A}$
			$T_C = 125^\circ\text{C}$	-	1.0	80	$\mu\text{A}$
			$T_C = 175^\circ\text{C}$	-	2.0	160	$\mu\text{A}$
$Q_C$	Total Capacitive Charge	$V_R = 400$ V	$T_C = 25^\circ\text{C}$	-	43	-	nC
C	Total Capacitance	$V_R = 1$ V	$f = 100$ kHz		1280		pF
		$V_R = 200$ V	$f = 100$ kHz		139		
		$V_R = 400$ V	$f = 100$ kHz		108		

**Table 6. THERMAL RESISTANCE**

Parameters		Min	Typ	Max	Unit
$R_{\theta JC}$ (per MOSFET chip)	Q1,Q2 Thermal Resistance Junction-to-Case (Note 5)	-	0.19	0.27	$^\circ\text{C/W}$
$R_{\theta JS}$					

# FAM65CR51AXZ1, FAM65CR51AXZ2

## PARAMETER DEFINITIONS

$BV_{DSS}$	<p>Q1, Q2 MOSFET Drain-to-Source Breakdown Voltage</p> <p>The maximum drain-to-source voltage the MOSFET can endure without the avalanche breakdown of the body-drain P-N junction in off state.</p> <p>The measurement conditions are to be found in Table 3.</p> <p>The typ. Temperature behavior is described in Figure 13</p>
$V_{GS(th)}$	<p>Q1, Q2 MOSFET Gate to Source Threshold Voltage</p> <p>The gate-to-source voltage measurement is triggered by a threshold ID current given in conditions at Table 4.</p> <p>The typ. Temperature behavior can be found in Figure 10</p>
$R_{DS(on)}$	<p>Q1, Q2 MOSFET On Resistance</p> <p><math>R_{DS(on)}</math> is the total resistance between the source and the drain during the on state.</p> <p>The measurement conditions are to be found in Table 3.</p> <p>The typ behavior can be found in Figure 11 and Figure 12 as well as Figure 17</p>
$g_{FS}$	<p>Q1, Q2 MOSFET Forward Transconductance</p>

## FAM65CR51AXZ1, FAM65CR51AXZ2

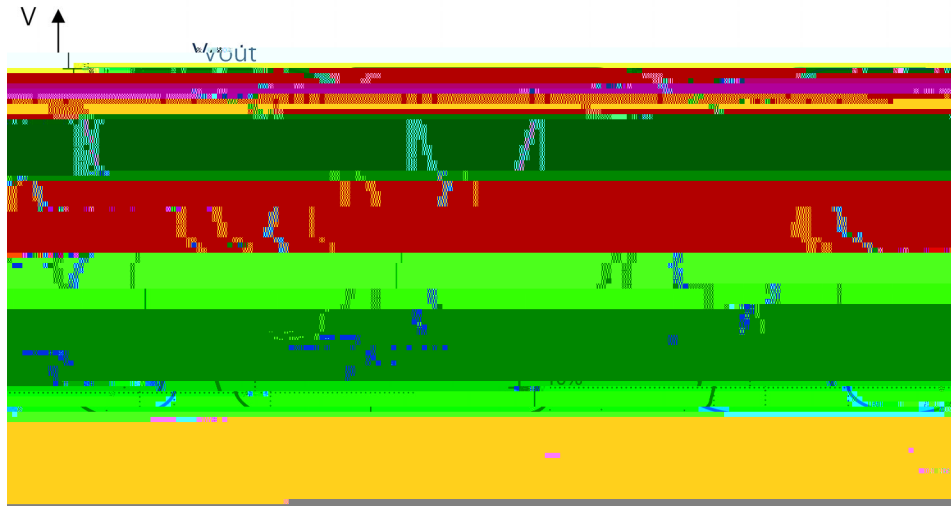


Figure 3. Timing Measurement Variable Definition

Table 8. PARAMETER OF SWITCHING CHARACTERISTICS

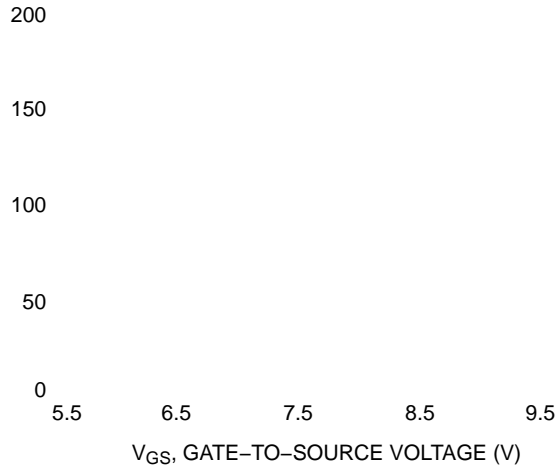
Turn-On Delay ( $t_{d(on)}$ )	This is the time needed to charge the input capacitance, $C_{iss}$ , before the load current $I_D$ starts flowing. The measurement conditions are described in the Table 3. For signal definition please check Figure 3 above.
Rise Time ( $t_r$ )	The rise time is the time to discharge output capacitance, $C_{oss}$ . After that time the MOSFET conducts the given load current $I_D$ . The measurement conditions are described in the Table 3. For signal definition please check Figure 3 above.
Turn-On Time ( $t_{on}$ )	

FAM65CR51AXZ1, FAM65CR51AXZ2

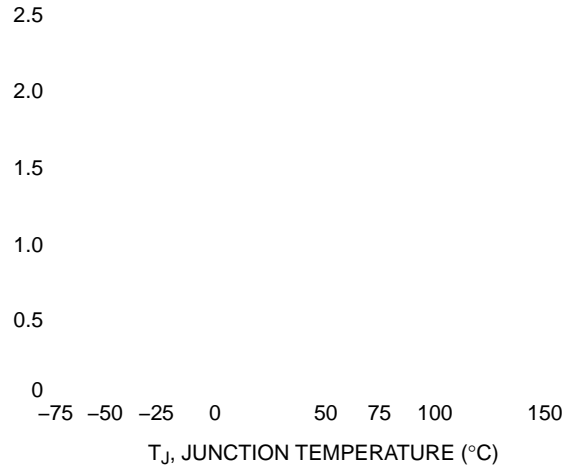


# FAM65CR51AXZ1, FAM65CR51AXZ2

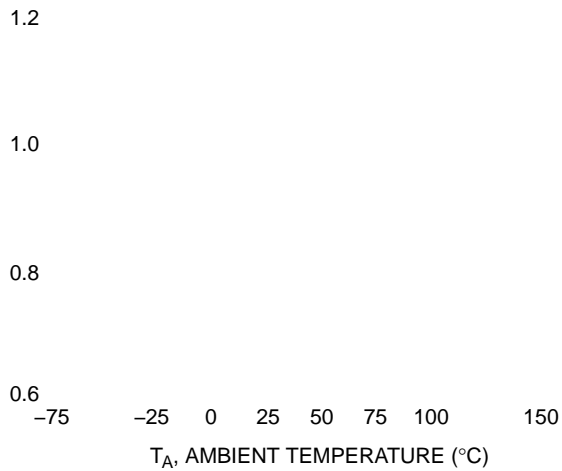
## TYPICAL CHARACTERISTICS – MOSFETs



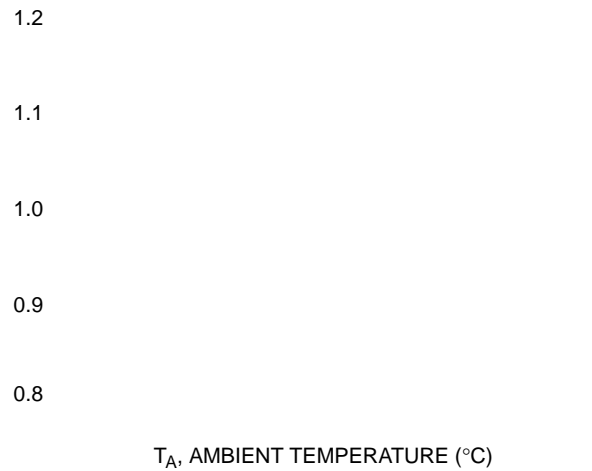
**Figure 10. On-Resistance vs. Gate-to-Source Voltage**



**Figure 11. R<sub>DS(norm)</sub> vs. Junction Temperature**



**Figure 12. Normalized Gate Threshold Voltage vs. Temperature**



**Figure 13. Normalized Breakdown Voltage vs. Temperature**





**APMCD-A16 / 12LD, AUTOMOTIVE MODULE**

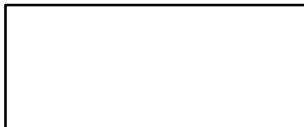


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**1. DIMENSIONS**

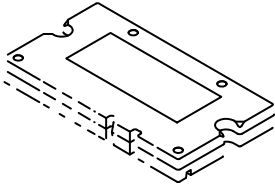
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**GENERIC  
MARKING DIAGRAM\***



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**APMCD-B16 / 12LD, AUTOMOTIVE MODULE**  
CASE MODGK  
ISSUE D

DATE 04 NOV 2021

**GENERIC  
MARKING DIAGRAM\***

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.

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