



July. 2014

FPF1C2P5BF07A

F1 Module solution for PV-Application

General Description

Fairchild's brand-new DC-DC module is designed for a power stage that needs more compact design. And the Press-fit technology provides simple and reliable mounting. This module is optimized for the application such as solar inverter where a high efficiency and robust design are needed.

Electrical Features

- High Efficiency
- Low Conduction and Switching losses
- Low $R_{DS(ON)}$: 90 m Ω max.
- Fast Recovery Body Diode
- Built-in NTC for temperature monitoring

Mechanical Features

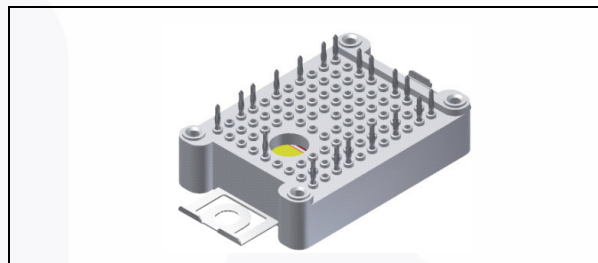
- Compact size : F1 Package
- Press-fit contact technology

Applications

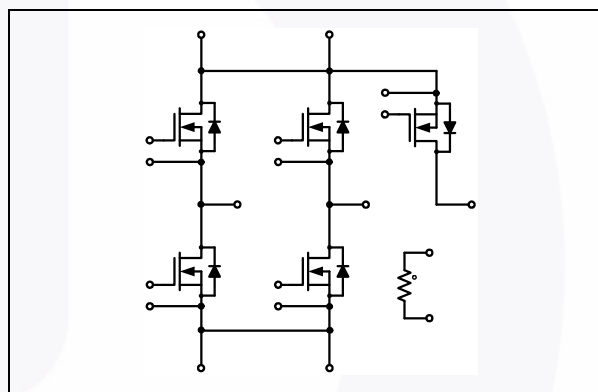
- Solar Inverter

Certification

- UL approved (E209204)



Package Code: F1



Internal Circuit Diagram

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Description	Rating	Units
V _{DSS}	Drain-Source Voltage	650	V
V _{GSS}	Gate-Source Voltage	± 20	V
I _D	Continuous Drain Current @ T _C = 25°C	36	A
	@ T _C = 80°C	27	A
I _{DM}	Pulsed Drain Current Limited by T _J max.	156	A
I _S	Continuous Source-Drain Forward Current	36	A
I _{SM}	Maximum Pulsed Source-Drain Forward Current	156	A
P _D	Maximum Power Dissipation @ T _C = 25°C	250	W
T _J	Operating Junction Temperature	-40 to +150	°C

Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted. (Continued)

Symbol	Description		Rating	Units
Module				
T _{STG}	Storage Temperature		-40 to +125	°C
V _{ISO}	Isolation Voltage	@ AC 1 _{MIN}	2500	V
Iso._Material	Internal Isolation Material		Al ₂ O ₃	
F _{MOUNT}	Mounting Force per Clamp		20 to 50	N
Weight		Typ.	22	g
Creepage	Terminal to Heatshink		11.5	mm
	Terminal to Terminal		6.3	mm
Clearance	Terminal to Heatshink		10.0	mm
	Terminal to Terminal		5.0	mm

Package Marking and Ordering Information

Device	Device Marking	Package	Packing Type	Quantity / Tray
FPF1C2P5BF07A	FPF1C2P5BF07A	F1	Tray	22

Electrical Characteristics $T_C = 25^\circ\text{C}$ unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0 V, I _D = 1 mA	650	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 650 V, V _{GS} = 0 V	-	-	25	μA
I _{GSS}	Gate-Body Leakage Current, Forward	V _{GS} = 20 V, V _{DS} = 0 V	-	-	2.5	μA
On Characteristics						
V _{GS(th)}	Gate-Source Threshold Voltage	V _{GS} = V _{DS} , I _D = 250 μA	-	3.8	-	V
R _{DS(ON)}	Static Drain-Source On-Resistance	I _D = 27 A, V _{GS} = 10 V	-	-	90	mΩ
		I _D = 27 A, V _{GS} = 10 V @T _C = 125°C	-	135	-	mΩ
		I _D = 47 A, V _{GS} = 10 V	-	76	-	mΩ
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 380 V I _D = 27 A V _{GS} = 10 V R _{G(ON)} = 51 Ω R _{G(OFF)} = 3 Ω Inductive Load T _C = 25 °C	-	192	-	ns
t _r	Rise Time		-	75	-	ns
t _{d(off)}	Turn-Off Delay Time		-	140	-	ns
t _f	Fall Time		-	13	-	ns
E _{ON}	Turn-On Switching Loss per Pulse		-	2.29	-	mJ
E _{OFF}	Turn-Off Switching Loss per Pulse		-	58	-	μJ
t _{d(on)}	Turn-On Delay Time	V _{CC} = 380 V I _D = 27 A V _{GS} = 10 V R _{G(ON)} = 51 Ω R _{G(OFF)} = 3 Ω Inductive Load T _C = 125 °C	-	159	-	ns
t _r	Rise Time		-	82	-	ns
t _{d(off)}	Turn-Off Delay Time		-	156	-	ns
t _f	Fall Time		-	13	-	ns
E _{ON}	Turn-On Switching Loss per Pulse		-	4.06	-	mJ
E _{OFF}	Turn-Off Switching Loss per Pulse		-	65	-	μJ
Q _{g(total)}	Total Gate Charge	V _{DS} = 380 V, V _{GS} = 0V...+10 V, I _D = 27 A	-	155	-	nC
R _{θJC}	Thermal Resistance of Junction to Case	per Chip	-	-	0.5	°C/W
Switching Characteristics : Body Diode						
V _{SD}	Source-Drain Diode Forward Voltage	I _{SD} = 27 A, V _{GS} = 0 V	-	-	1.5	V
		I _{SD} = 47 A, V _{GS} = 0 V	-	1.3	-	V
t _{rr}	Reverse Recovery Time	I _{SD} = 27 A dI _F /dt = 364 A/μs	-	109	-	ns
I _{rr}	Reverse Recovery Current		-	39	-	A
Q _{rr}	Reverse Recovery Charge		-	2000	-	nC
t _{rr}	Reverse Recovery Time	I _{SD} = 27A dI _F /dt = 320 A/μs @T _C = 125°C	-	179	-	ns
I _{rr}	Reverse Recovery Current		-	55	-	A
Q _{rr}	Reverse Recovery Charge		-	4802	-	nC
NTC						
R _{NTC}	Rated Resistance	T _C = 25°C	-	10	-	kΩ
		T _C = 100°C	-	936	-	Ω
	Tolerance	T _C = 25°C	-3	-	+3	%
P _D	Power Dissipation	T _C = 25°C	-	-	20	mW
B _{Value}	B-Constance	B _{25/50}	-	3450	-	K
		B _{25/100}	-	3513	-	K

Typical Performance Characteristic

Fig 1. On-Region Characteristics

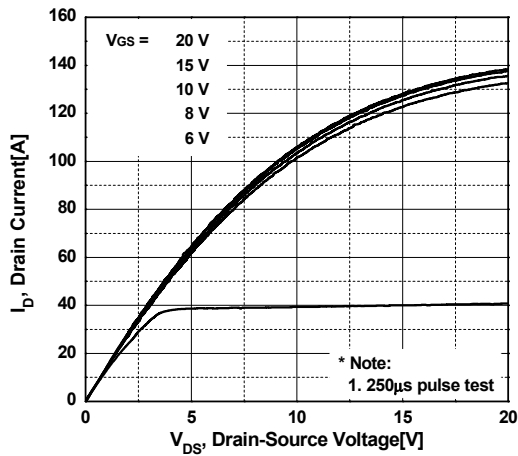


Fig 2. On-Resistance Variation vs. Drain Current and Gate Voltage

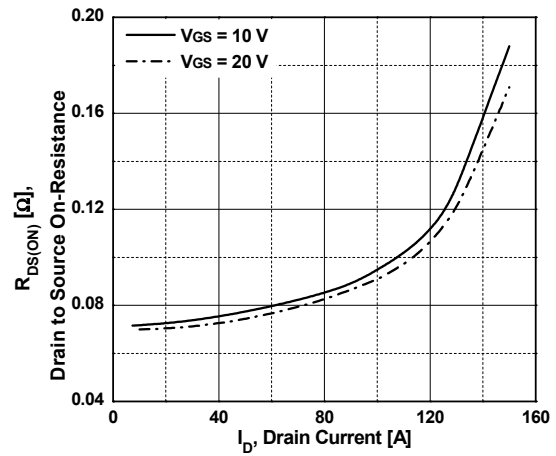


Fig 3. On-Resistance Variation vs. Temperature

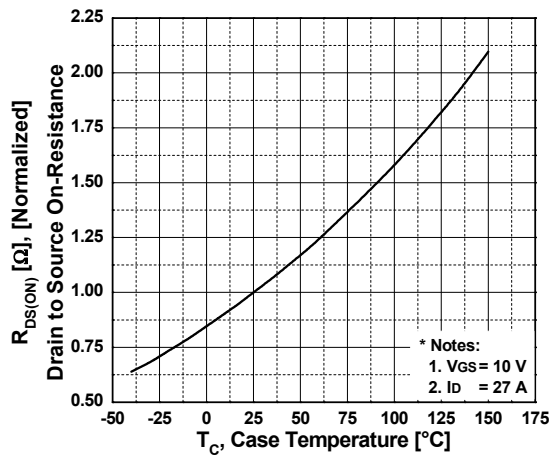


Fig 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

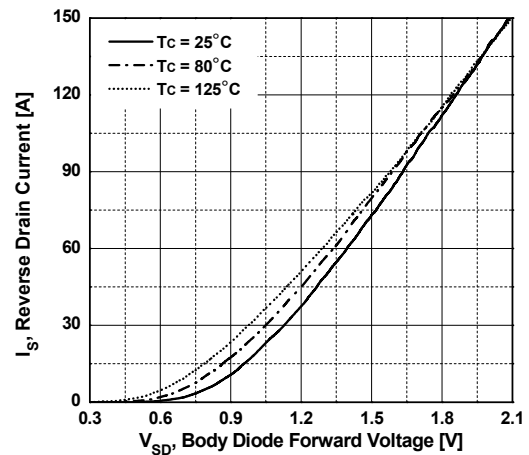


Fig 5. Turn-Off Loss vs. Drain Current

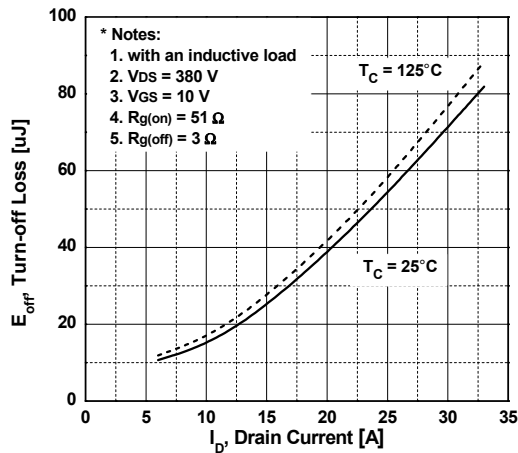
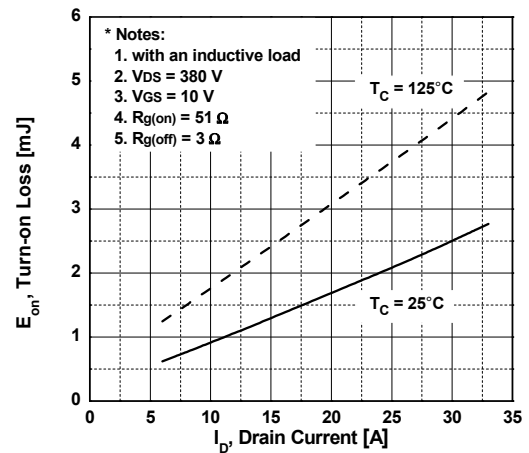


Fig 6. Turn-On Loss vs. Drain Current



Typical Performance Characteristic (Continued)

Fig 7. Turn-Off Loss vs. Turn-Off Gate Resistor Values

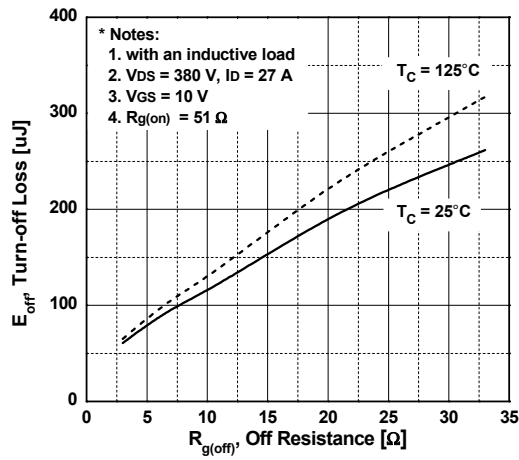


Fig 8. Transient Thermal Response Curve

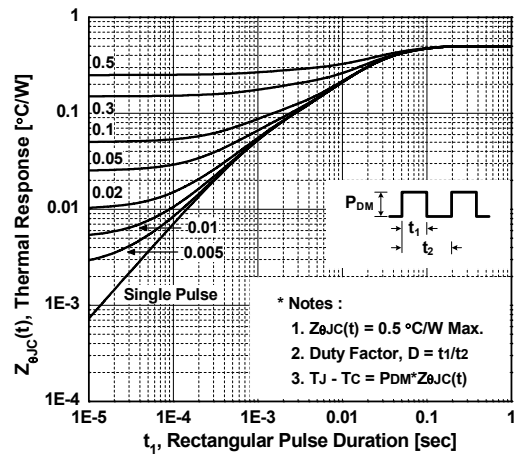
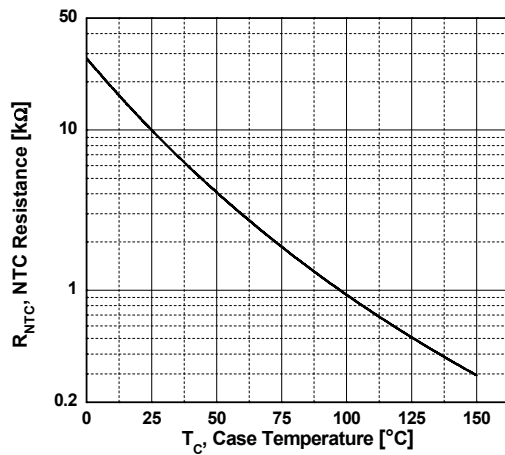
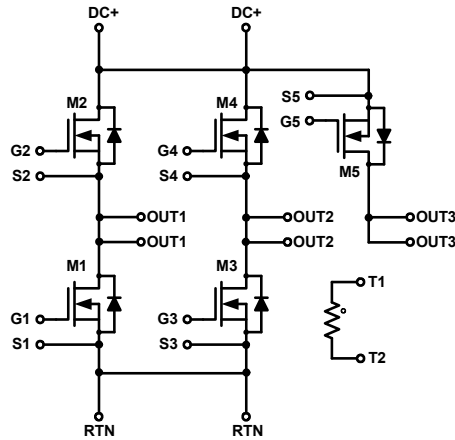


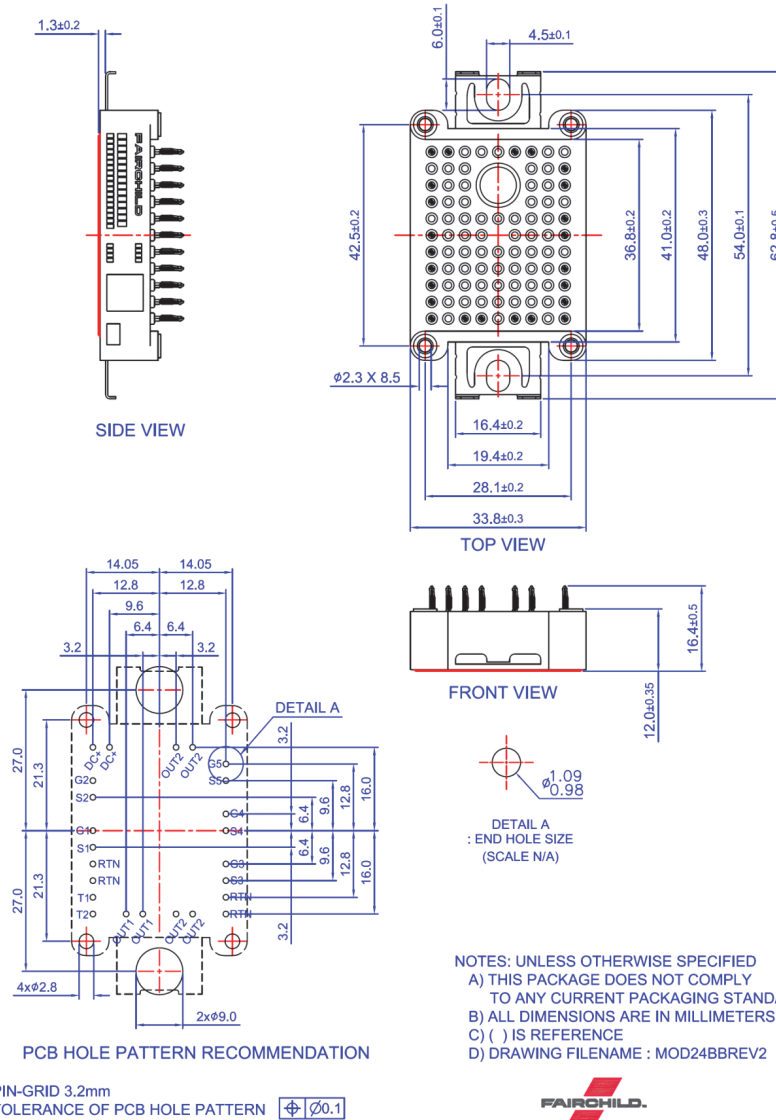
Fig 9. Typical NTC Value vs. Temperature



Internal Circuit Diagram



Package Outlines [mm]





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Rev. 166



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