Ordering number : ENA1477

SANYO Semiconductors

DATA SHEET

N-Channel Silicon MOSFET

EFC4612R — General-Purpose Switching Device Applications

Features

- 2.5V drive.
- Built-in gate protection resistor.
- Best suited for LiB charging and discharging switch.
- Common-drain type.

Specifications

Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Conditions	Ratings	Unit
Source-to-Source Voltage	V_{SSS}		24	V
Gate-to-Source Voltage	V_{GSS}		±12	V
Source Current (DC)	I_S		6	A
Source Current (Pulse)	I_{SP}	PW≤10μs, duty cycle≤1%	60	A
Total Dissipation	P_T	When mounted on ceramic substrate (5000mm^2×0.8mm)	1.6	W
Channel Temperature	Tch		150	°C
Storage Temperature	Tstg		−55 to +150	°C

Electrical Characteristics at Ta=25°C

Parameter	Symbol	Conditions		Ratings			Unit
				min	typ	max	
Source-to-Source Breakdown Voltage	$V_{(BR)SSS}$	I_S=1mA, V_{GS}=0V	Test Circuit 1	24			V
Zero-Gate Voltage Source Current	I_{SSS}	V_{SS}=20V, V_{GS}=0V	Test Circuit 1			1	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±8V, V_{SS}=0V	Test Circuit 2			±10	μA
Cutoff Voltage	$V_{GS(off)}$	V_{SS}=10V, I_S=1mA	Test Circuit 3	0.5		1.3	V
Forward Transfer Admittance	$\|yfs\|$	V_{SS}=10V, I_S=3A	Test Circuit 4		3.1		S

Marking : FN

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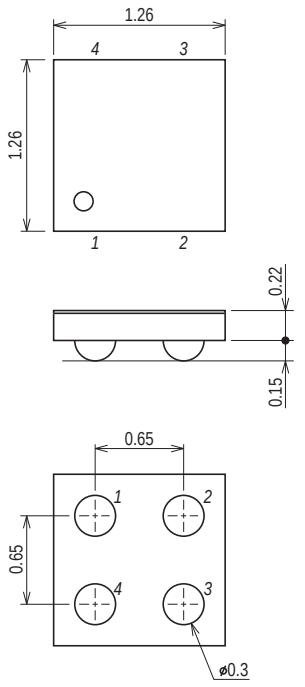
Parameter	Symbol	Conditions		Ratings min	Ratings typ	Ratings max	Unit
Static Source-to-Source On-State Resistance	R_{SS}(on)1	I_S=3A, V_{GS}=4.5V	Test Circuit 5	24	39	45	mΩ
	R_{SS}(on)2	I_S=3A, V_{GS}=4.0V	Test Circuit 5	25	41	48	mΩ
	R_{SS}(on)3	I_S=3A, V_{GS}=3.7V	Test Circuit 5	27.5	43	50	mΩ
	R_{SS}(on)4	I_S=3A, V_{GS}=3.1V	Test Circuit 5	31.5	48	57	mΩ
	R_{SS}(on)5	I_S=3A, V_{GS}=2.5V	Test Circuit 5	33.5	58	72	mΩ
Turn-ON Delay Time	t_d(on)	See specified Test Circuit.	Test Circuit 7		20		ns
Rise Time	t_r	See specified Test Circuit.	Test Circuit 7		230		ns
Turn-OFF Delay Time	t_d(off)	See specified Test Circuit.	Test Circuit 7		130		ns
Fall Time	t_f	See specified Test Circuit.	Test Circuit 7		210		ns
Total Gate Charge	Qg	V_{SS}=10V, V_{GS}=4.5V, I_S=6A			7		nC
Forward Source-to-Source Voltage	$V_{F(S-S)}$	I_S=3A, V_{GS}=0V	Test Circuit 6		0.8	1.2	V

Package Dimensions

unit : mm (typ)

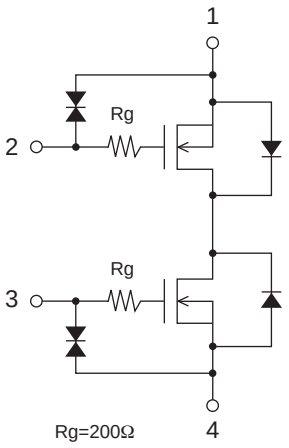
7064-001



1 : Source1
2 : Gate1
3 : Gate2
4 : Source2

SANYO : EFCP1313-4CC-037

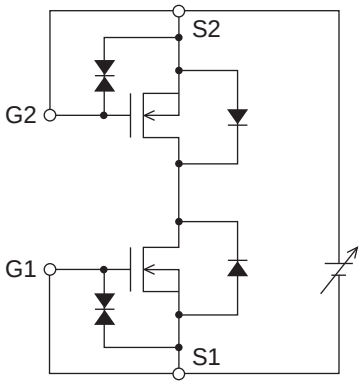
Electrical Connection



1 : Source1
2 : Gate1
3 : Gate2
4 : Source2

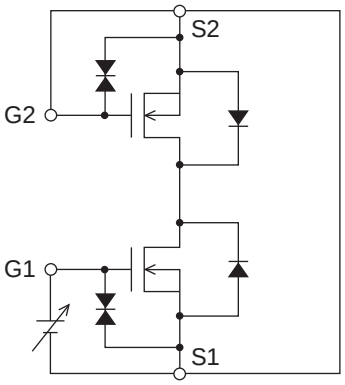
Test circuits are example of measuring FET1 side

Test Circuit 1
V_{SSS} / I_{SSS}



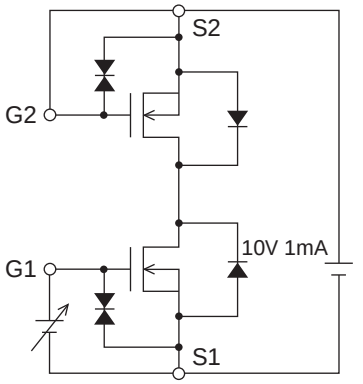
IT11565

Test Circuit 2
I_{GSS}(+) / (--)



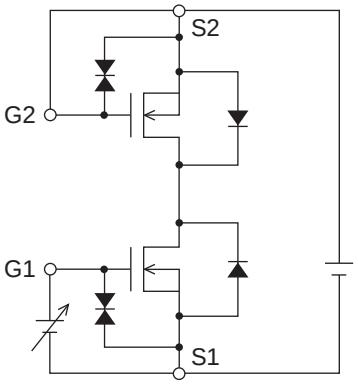
IT11566

Test Circuit 3
V_{GS}(off)



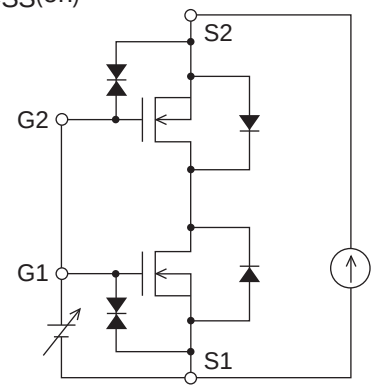
IT11567

Test Circuit 4
| yfs |



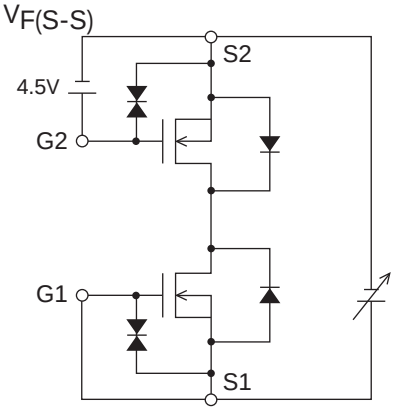
IT11568

Test Circuit 5
R_{SS}(on)



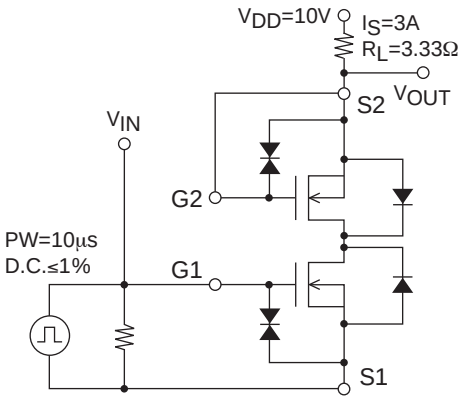
IT11569

Test Circuit 6
$V_{F(S-S)}$

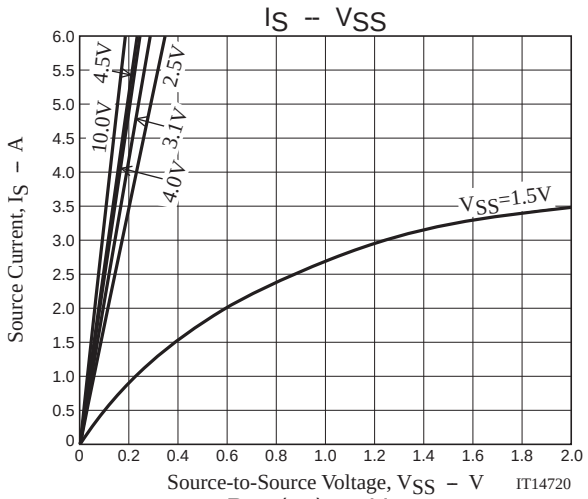


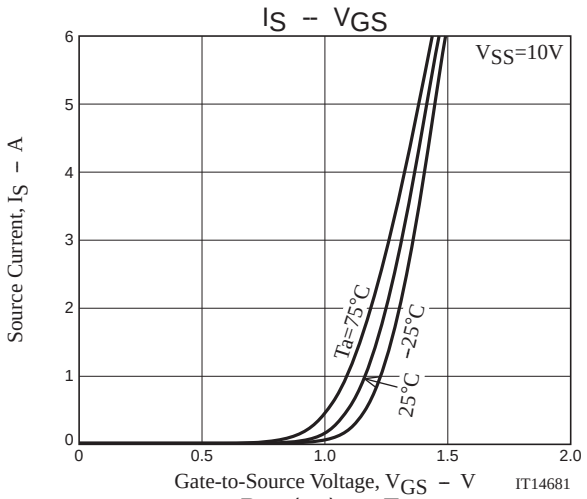
IT11570

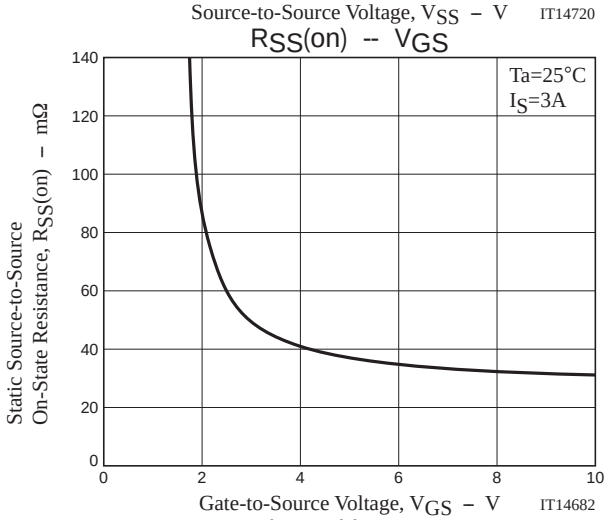
Test Circuit 7
t_d(on), t_r, t_d(off), t_f

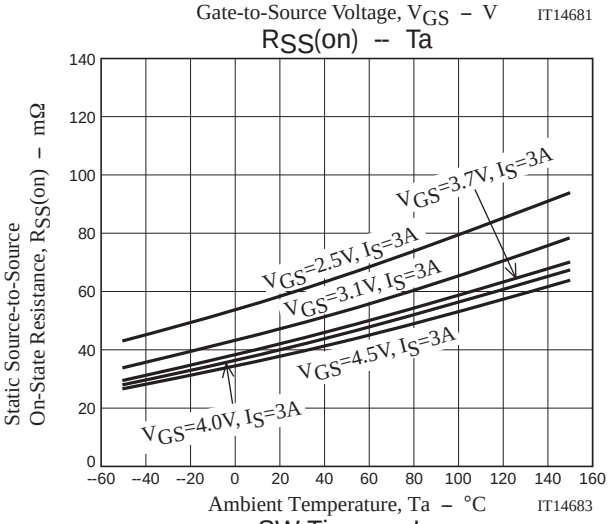


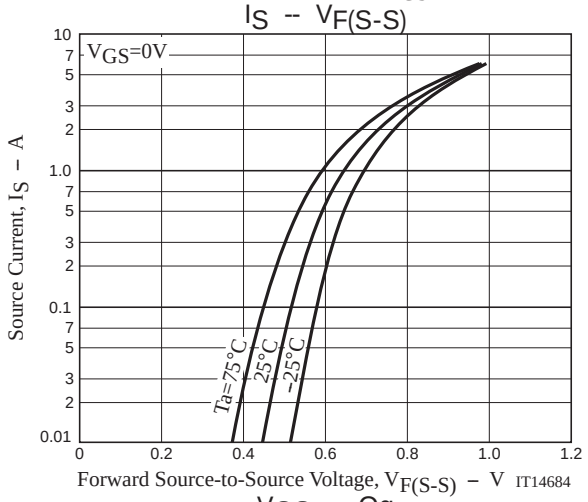
* Note: Connect the mesurement terminal reversely if you want to measure the FET2 side.

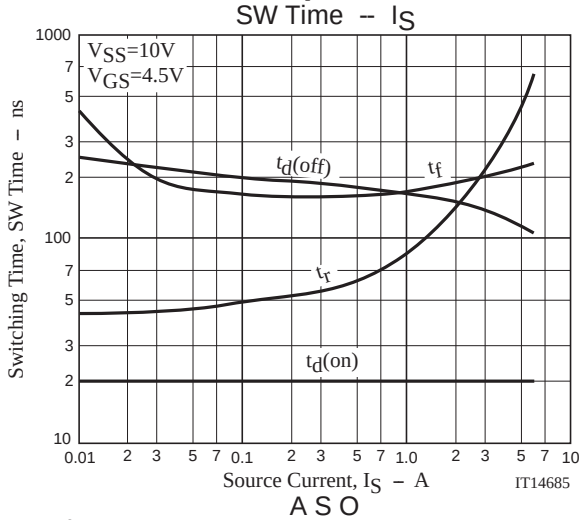

IS -- VSS
Source Current, IS – A
Source-to-Source Voltage, VSS – V
IT14720
VSS=1.5V
10.0V
4.5V
4.0V
3.1V
2.5V

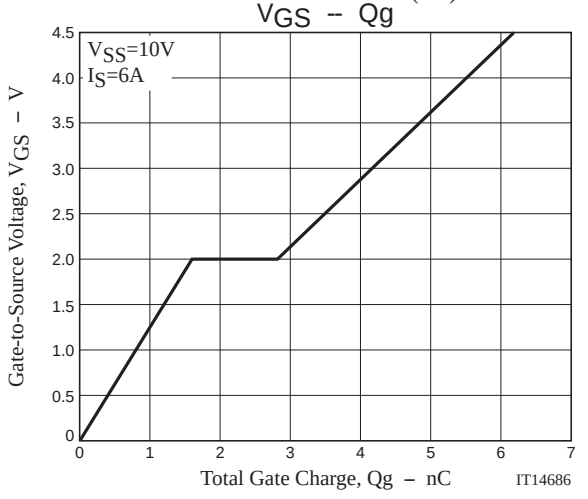

IS -- VGS
Source Current, IS – A
Gate-to-Source Voltage, VGS – V
IT14681
VSS=10V
Ta=75°C
25°C
–25°C

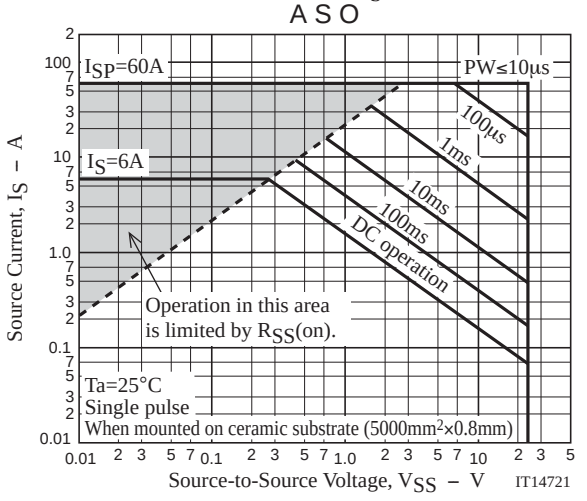

RSS(on) -- VGS
Static Source-to-Source
On-State Resistance, RSS(on) – mΩ
Gate-to-Source Voltage, VGS – V
IT14682
Ta=25°C
IS=3A

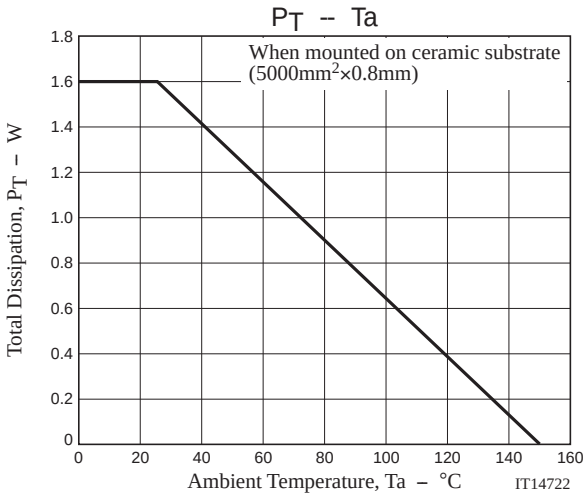

RSS(on) -- Ta
Static Source-to-Source
On-State Resistance, RSS(on) – mΩ
Ambient Temperature, Ta – °C
IT14683
VGS=3.7V, IS=3A
VGS=2.5V, IS=3A
VGS=3.1V, IS=3A
VGS=4.5V, IS=3A
VGS=4.0V, IS=3A


IS -- VF(S-S)
Source Current, IS – A
Forward Source-to-Source Voltage, VF(S-S) – V
IT14684
VGS=0V
Ta=75°C
25°C
–25°C


SW Time -- IS
Switching Time, SW Time – ns
Source Current, IS – A
IT14685
VSS=10V
VGS=4.5V
td(off)
tf
tr
td(on)


VGS -- Qg
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC
IT14686
VSS=10V
IS=6A


A S O
Source Current, IS – A
Source-to-Source Voltage, VSS – V
IT14721
ISP=60A
PW≤10μs
IS=6A
100μs
1ms
10ms
100ms
DC operation
Operation in this area
is limited by RSS(on).
Ta=25°C
Single pulse
When mounted on ceramic substrate (5000mm²×0.8mm)



Note on usage : Since the EFC4612R is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.