H7N1004FM

Silicon N-Channel MOSFET
High-Speed Power Switching

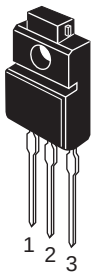
R07DS0209EJ0300
Rev.3.00
Feb 23, 2012

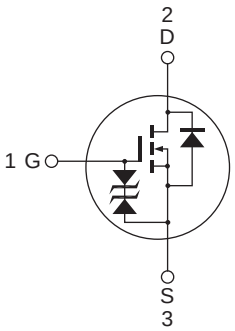
Features

- Low on-resistance
- $R_{DS(on)}$ = 25 mΩ typ.
- Low drive current
- Available for 4.5 V gate drive

Outline

RENESAS Package code: PRSS0003AD-A
(Package name: TO-220FM)





1. Gate
2. Drain
3. Source

Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value	Unit
Drain to source voltage	V_{DSS}	100	V
Gate to source voltage	V_{GSS}	±20	V
Drain current	I_D	25	A
Drain peak current	I_D (pulse)[Note1]	100	A
Body-drain diode reverse drain current	I_{DR}	25	A
Avalanche current	I_{AP} [Note 3]	15	A
Avalanche energy	E_{AR} [Note 3]	22.5	mJ
Channel dissipation	Pch [Note 2]	25	W
Channel temperature	Tch	150	°C
Storage temperature	Tstg	–55 to +150	°C

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. Value at Tc = 25°C
3. Value at Tch = 25°C, Rg ≥ 50 Ω

Electrical Characteristics

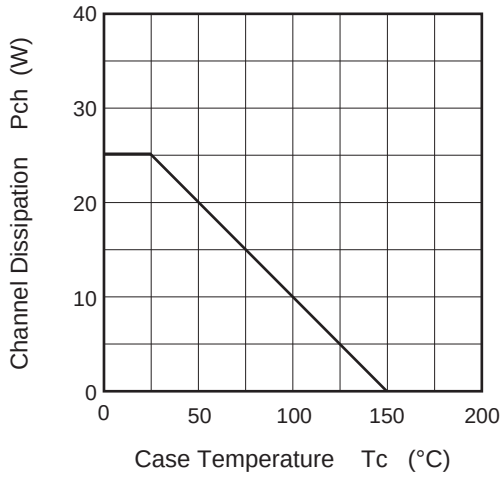
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	100	—	—	V	I_D = 10 mA, V_{GS} = 0
Gate to source breakdown voltage	$V_{(BR)GSS}$	±20	—	—	V	I_G = ±100 μA, V_{DS} = 0
Gate to source leak current	I_{GSS}	—	—	±10	μA	V_{GS} = ±16 V, V_{DS} = 0
Zero gate voltage drain current	I_{DSS}	—	—	10	μA	V_{DS} = 100 V, V_{GS} = 0
Gate to source cutoff voltage	$V_{GS(off)}$	1.5	—	2.5	V	I_D = 1 mA, V_{DS} = 10 V Note 4
Static drain to source on state resistance	$R_{DS(on)}$	—	25	35	mΩ	I_D = 12.5 A, V_{GS} = 10 V Note 4
		—	30	45	mΩ	I_D = 12.5 A, V_{GS} = 4.5 V Note 4
Forward transfer admittance	|yfs|	20	35	—	S	I_D = 12.5 A, V_{GS} = 10 V Note 4
Input capacitance	Ciss	—	2800	—	pF	V_{DS} = 10 V
Output capacitance	Coss	—	240	—	pF	V_{GS} = 0
Reverse transfer capacitance	Crss	—	140	—	pF	f = 1 MHz
Total gate charge	Qg	—	50	—	nC	V_{DD} = 50 V
Gate to source charge	Qgs	—	9	—	nC	V_{GS} = 10 V
Gate to drain charge	Qgd	—	11	—	nC	I_D = 25 A
Turn-on delay time	$t_{d(on)}$	—	23	—	ns	V_{GS} = 10 V, I_D = 12.5 A
Rise time	t_r	—	110	—	ns	R_L = 2.4 Ω
Turn-off delay time	$t_{d(off)}$	—	70	—	ns	Rg = 4.7 Ω
Fall time	t_f	—	9.5	—	ns	
Body-drain diode forward voltage	V_{DF}	—	0.89	—	V	I_F = 25 A, V_{GS} = 0
Body-drain diode reverse recovery time	t_{rr}	—	45	—	ns	I_F = 25 A, V_{GS} = 0 di_F/dt = 100 A/μs

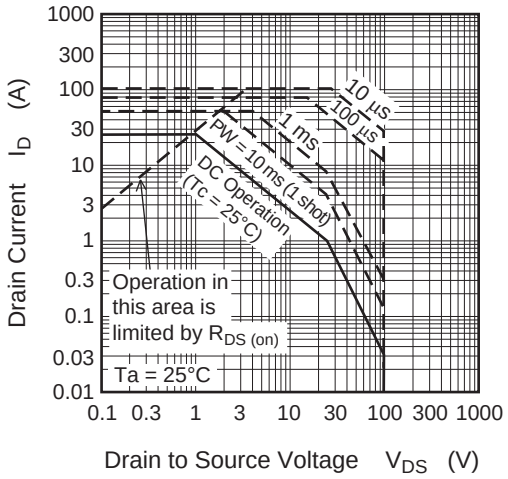
Notes: 4. Pulse test

Main Characteristics

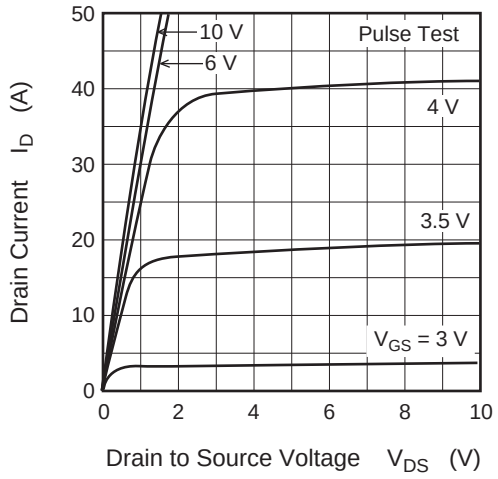
Power vs. Temperature Derating



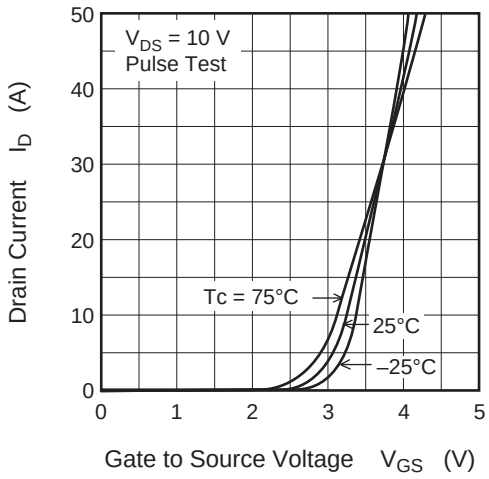
Maximum Safe Operation Area



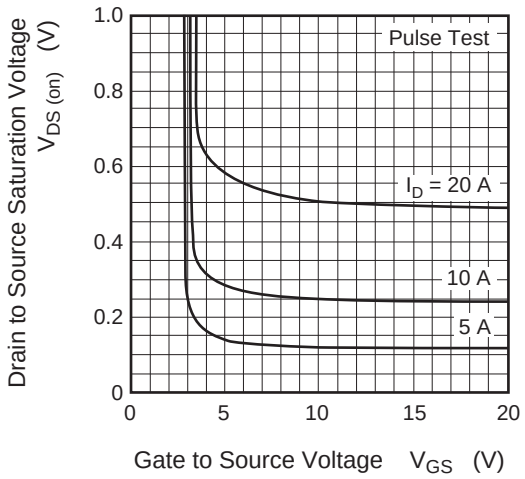
Typical Output Characteristics



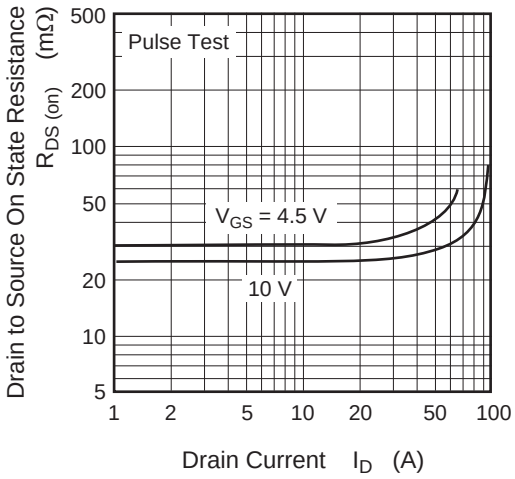
Typical Transfer Characteristics



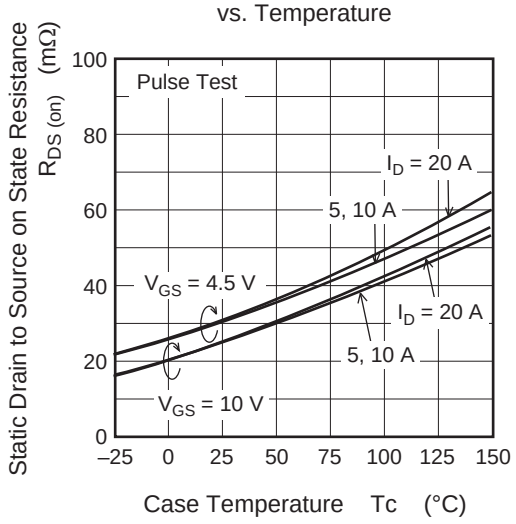
Drain to Source Saturation Voltage vs.
Gate to Source Voltage



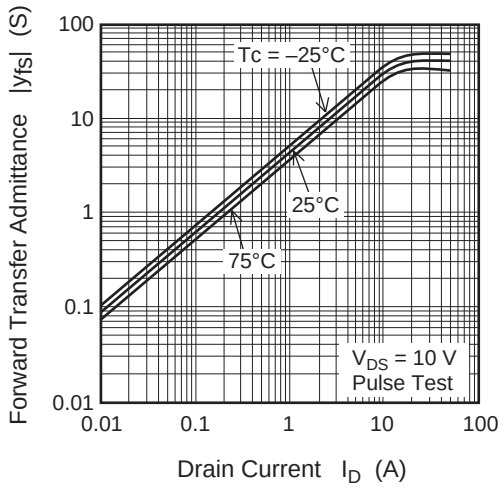
Static Drain to Source on State Resistance
vs. Drain Current



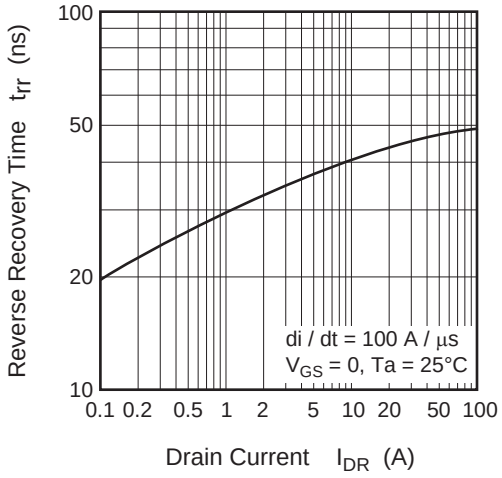
Static Drain to Source on State Resistance vs. Temperature



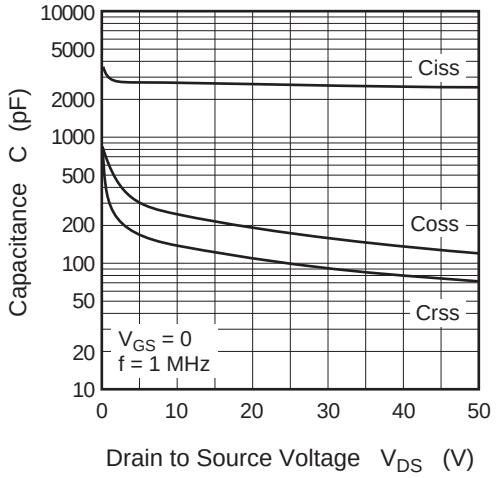
Forward Transfer Admittance vs. Drain Current



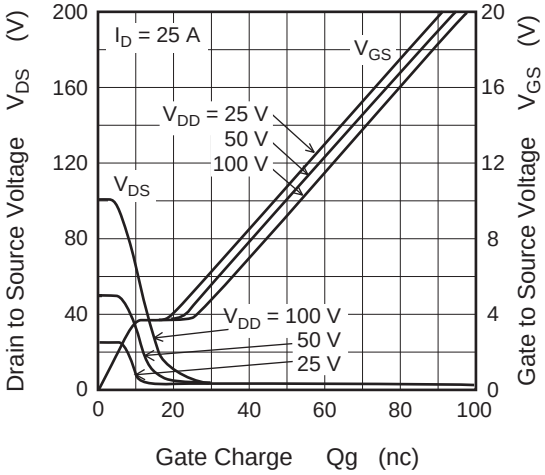
Static Drain to Source on State Resistance vs. Drain Current



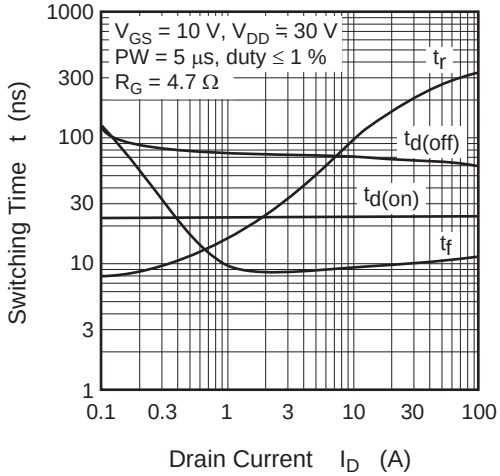
Typical Capacitance vs. Drain to Source Voltage



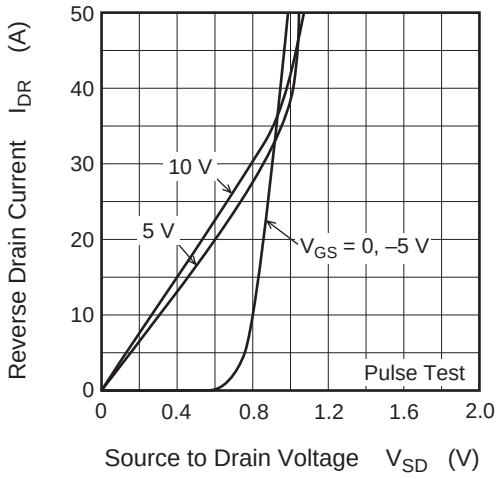
Dynamic Input Characteristics



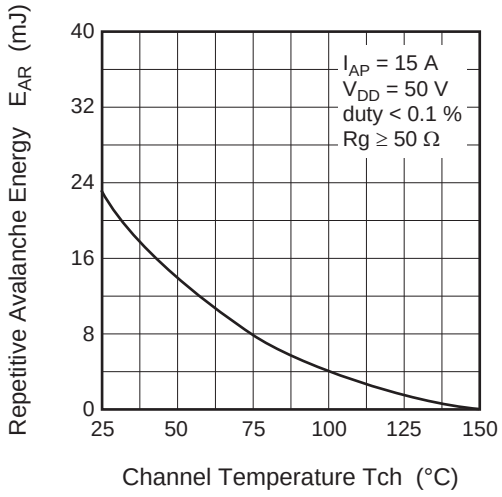
Switching Characteristics



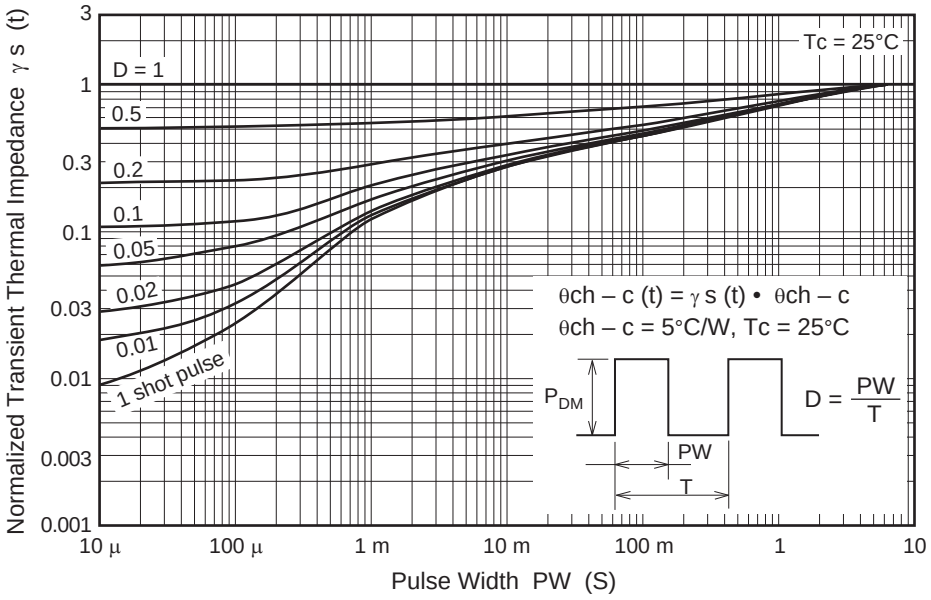
Reverse Drain Current vs.
Source to Drain Voltage



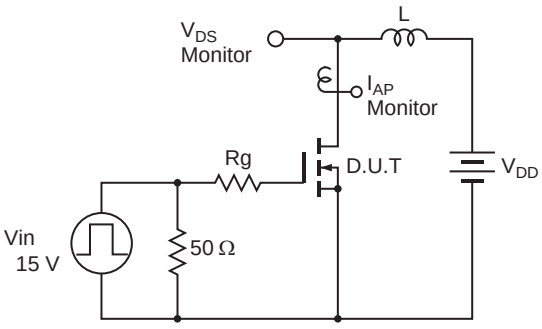
Maximum Avalanche Energy vs.
Channel Temperature Derating



Normalized Transient Thermal Impedance vs. Pulse Width

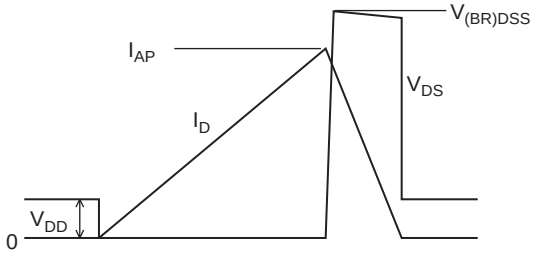


Avalanche Test Circuit

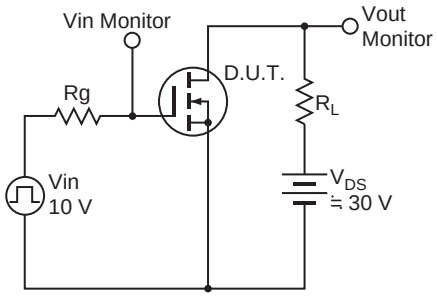


Avalanche Waveform

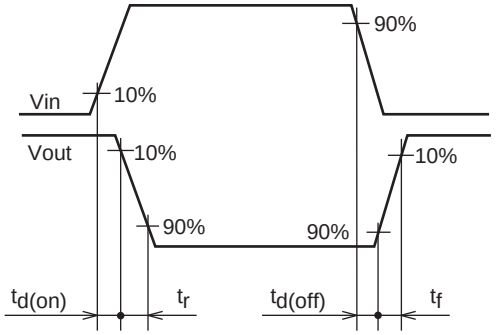
$$E_{AR} = \frac{1}{2} \bullet L \bullet I_{AP}^2 \bullet \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



Switching Time Test Circuit



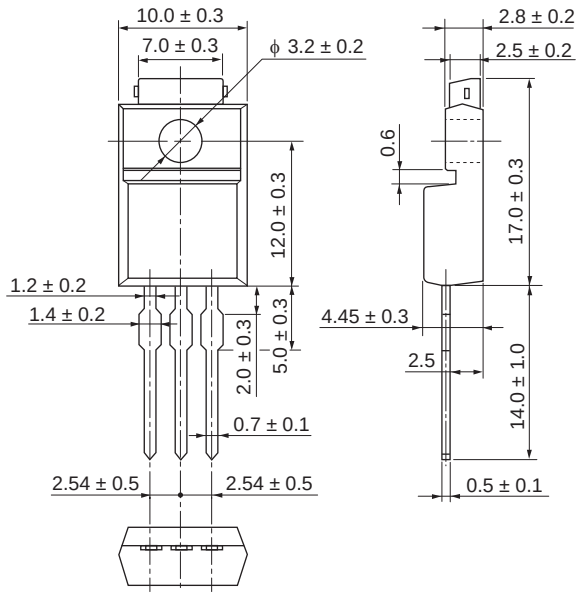
Switching Time Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
TO-220FM	SC-67	PRSS0003AD-A	TO-220FM / TO-220FMV	1.8g

Unit: mm



Ordering Information

Orderable Part Number	Quantity	Shipping Container
H7N1004FM-E	600 pcs	Box (Tube)

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