

RJM0603JSC

Silicon N/P Channel Power MOS FET (6 in 1 Type)
High Speed Power Switching

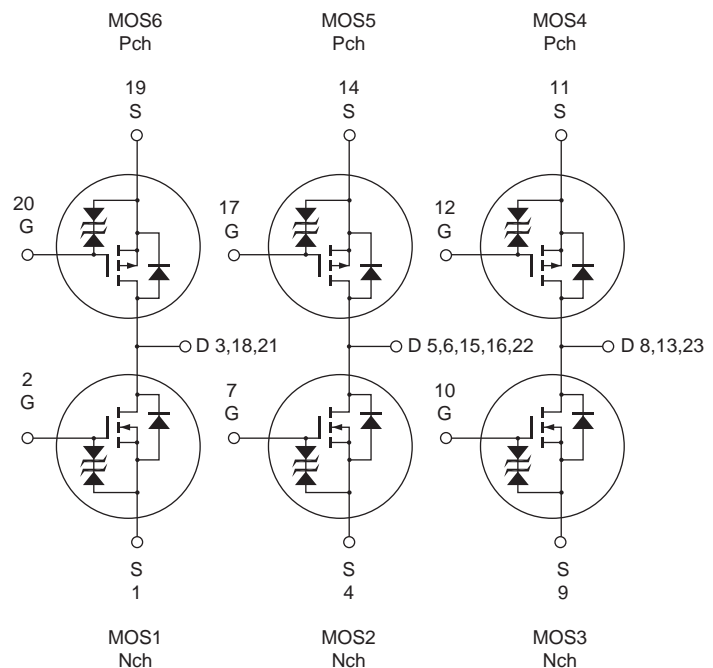
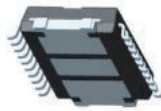
R07DS0339EJ0501
Rev.5.01
Jul 22, 2011

Features

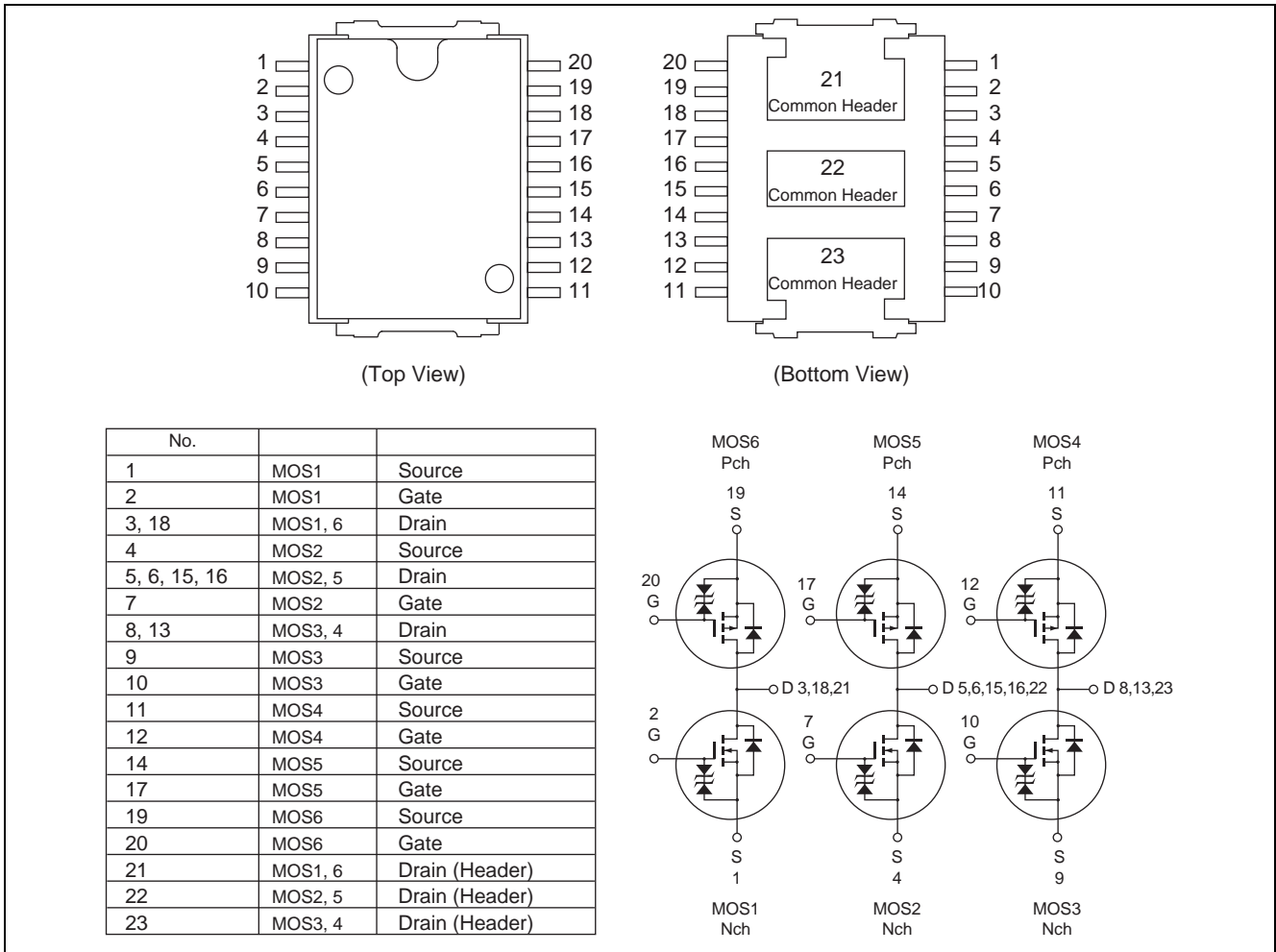
- For Automotive applications
- AEC-Q101 compliant
- N/P Channel MOS FET (6 in 1 Type). High density mounting
- Low on-resistance
- Capable of 4.5 V gate drive

Outline

RENESAS Package Code: PRSP0020DF-A
(Package Name: HSOP-20)



Pin Arrangement



Absolute Maximum Ratings

(Ta = 25°C)

Item	Symbol	Value		Unit
		MOS1, 2, 3 (Nch)	MOS4, 5, 6 (Pch)	
Drain to source voltage	V _{DSS}	60	-60	V
Gate to source voltage	V _{GSS}	+20 / -5	-20 / +5	V
Drain current	I _D	20	-20	A
Drain peak current	I _D (pulse) ^{Note1}	80	-80	A
Channel dissipation	P _{ch} ^{Note2}	54	54	W
Avalanche current	I _{AP} ^{Note3}	20	20	A
Avalanche energy	E _{AR} ^{Note3}	34	34	mJ
Channel temperature	T _{ch} ^{Note4}	175	175	°C
Storage temperature	T _{stg}	-55 to +150	-55 to +150	°C

- Notes: 1. PW ≤ 10μs duty cycle ≤ 1%
 2. 1 Drive Operation ; Value at Tc = 25°C
 3. Value at Tch = 25°C, Rg ≥ 50 Ω
 4. AEC-Q101 compliant

Thermal Impedance Characteristics

- Channel to case thermal impedance θ_{ch-c}: 2.78°C/W

Electrical Characteristics

• MOS1, MOS2, MOS3 (N Channel)

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage drain current	I _{DSS}	—	—	10	μA	V _{DS} = 60 V, V _{GS} = 0
Gate to source leak current	I _{GSS}	—	—	±10	μA	V _{GS} = +20 V / -5 V, V _{DS} = 0
Gate to source cutoff voltage	V _{GS(off)}	1.0	—	2.5	V	V _{DS} = 10 V, I _D = 1 mA
Static drain to source on state resistance	R _{DS(on)}	—	16	20	mΩ	I _D = 10 A, V _{GS} = 10 V ^{Note5}
		—	21	32	mΩ	I _D = 10 A, V _{GS} = 4.5 V ^{Note5}
Input capacitance	C _{iss}	—	2600	—	pF	V _{DS} = 10V, V _{GS} = 0, f = 1 MHz
Output capacitance	C _{oss}	—	290	—	pF	
Reverse transfer capacitance	C _{rss}	—	140	—	pF	
Total gate charge	Q _g	—	43	—	nC	V _{DD} = 25 V, V _{GS} = 10 V, I _D = 20 A
Gate to source charge	Q _{gs}	—	6.2	—	nC	
Gate to drain charge	Q _{gd}	—	7.2	—	nC	
Turn-on delay time	t _{d(on)}	—	13	—	ns	V _{GS} = 10 V, I _D = 10 A, V _{DD} ≅ 30 V, R _L = 3 Ω, R _G = 4.7 Ω
Rise time	t _r	—	6	—	ns	
Turn-off delay time	t _{d(off)}	—	65	—	ns	
Fall time	t _f	—	4.5	—	ns	
Body-drain diode forward voltage	V _{DF}	—	0.91	1.18	V	I _F = 20 A, V _{GS} = 0 ^{Note5}
Body-drain diode reverse recovery time	t _{rr}	—	35	—	ns	I _F = 20 A, V _{GS} = 0 di _F /dt = 100 A/μs

Note: 5. Pulse test

• MOS4, MOS5, MOS6 (P Channel)

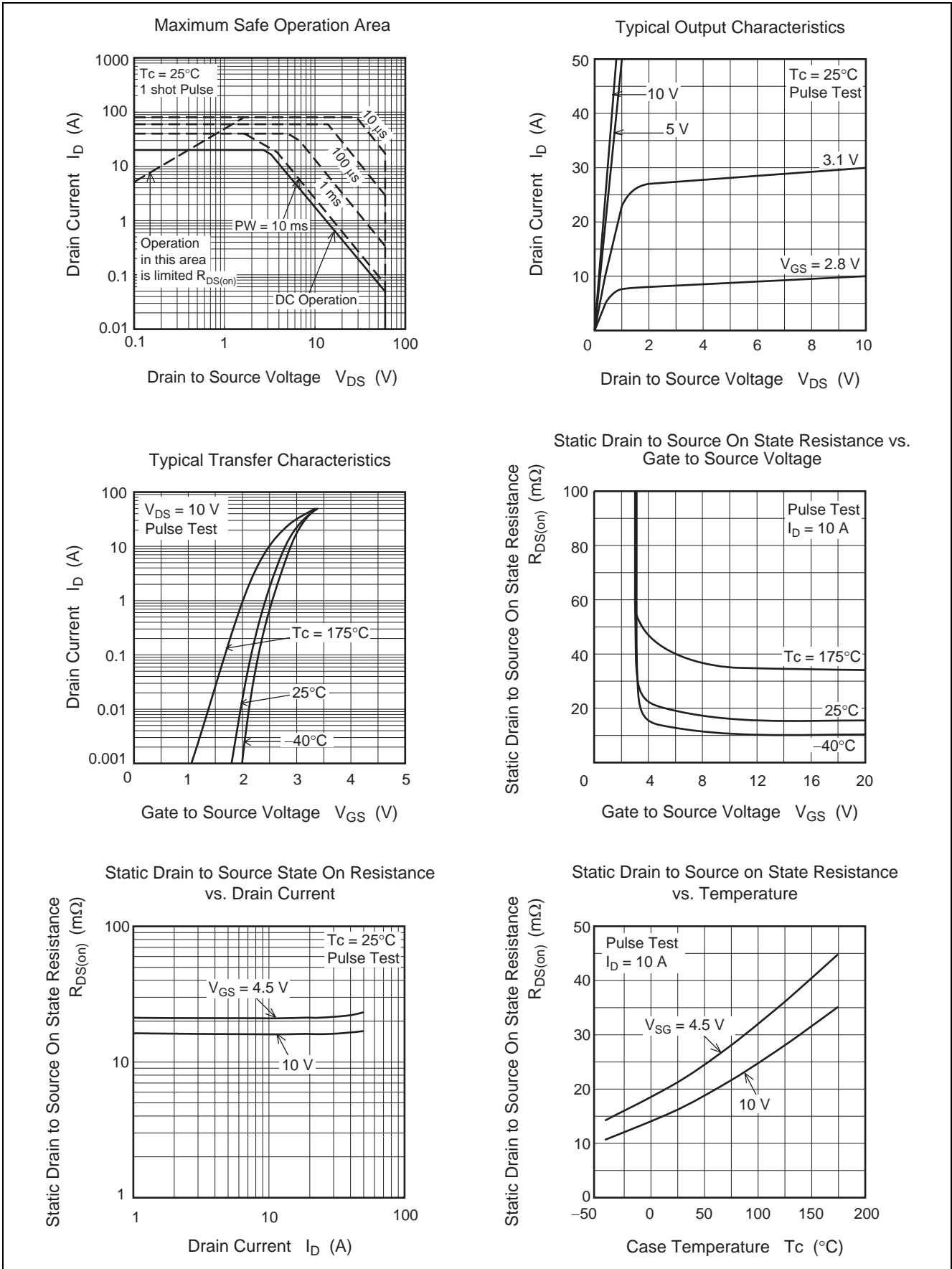
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage drain current	I _{DSS}	—	—	-10	μA	V _{DS} = -60 V, V _{GS} = 0
Gate to source leak current	I _{GSS}	—	—	±10	μA	V _{GS} = -20 V / +5 V, V _{DS} = 0
Gate to source cutoff voltage	V _{GS(off)}	-1.0	—	-2.5	V	V _{DS} = -10 V, I _D = -1 mA
Static drain to source on state resistance	R _{DS(on)}	—	32	40	mΩ	I _D = -10 A, V _{GS} = -10 V ^{Note6}
		—	42	64	mΩ	I _D = -10 A, V _{GS} = -4.5 V ^{Note6}
Input capacitance	C _{iss}	—	2600	—	pF	V _{DS} = -10 V, V _{GS} = 0, f = 1 MHz
Output capacitance	C _{oss}	—	330	—	pF	
Reverse transfer capacitance	C _{rss}	—	240	—	pF	
Total gate charge	Q _g	—	53	—	nC	V _{DD} = -25 V, V _{GS} = -10 V, I _D = -20 A
Gate to source charge	Q _{gs}	—	8.8	—	nC	
Gate to drain charge	Q _{gd}	—	13	—	nC	
Turn-on delay time	t _{d(on)}	—	22	—	ns	V _{GS} = -10 V, I _D = -10 A, V _{DD} ≅ -30 V, R _L = 3 Ω, R _G = 4.7 Ω
Rise time	t _r	—	17	—	ns	
Turn-off delay time	t _{d(off)}	—	100	—	ns	
Fall time	t _f	—	20	—	ns	
Body-drain diode forward voltage	V _{DF}	—	-0.95	-1.24	V	I _F = -20 A, V _{GS} = 0 ^{Note6}
Body-drain diode reverse recovery time	t _{rr}	—	50	—	ns	I _F = -20 A, V _{GS} = 0 di _F /dt = 100 A/μs

Note: 6. Pulse test

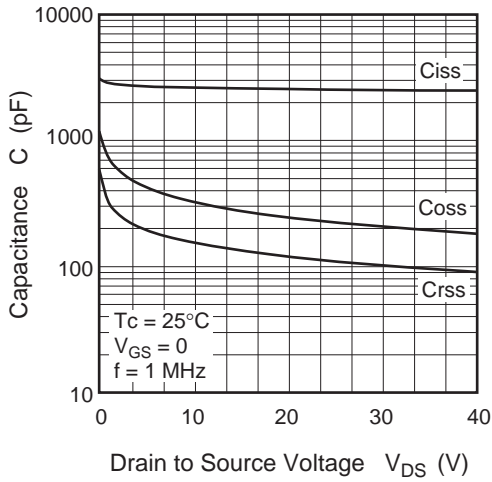
Main Characteristics

- MOS1, MOS2, MOS3 (N Channel)

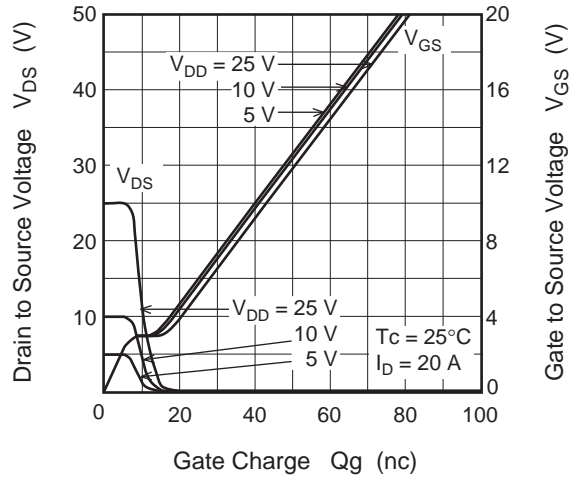


• MOS1, MOS2, MOS3 (N Channel)

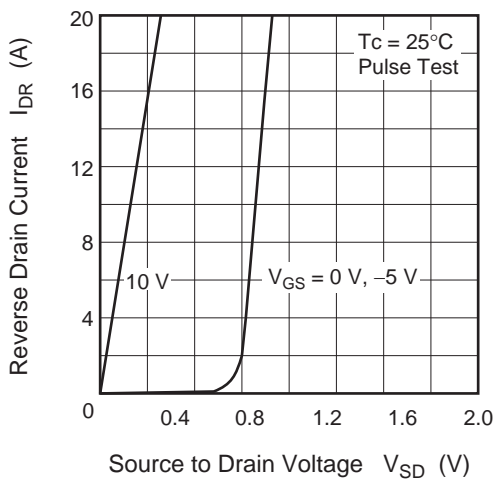
Typical Capacitance vs. Drain to Source Voltage



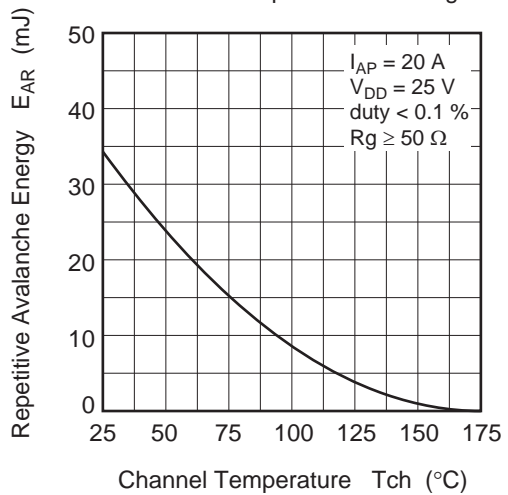
Dynamic Input Characteristics



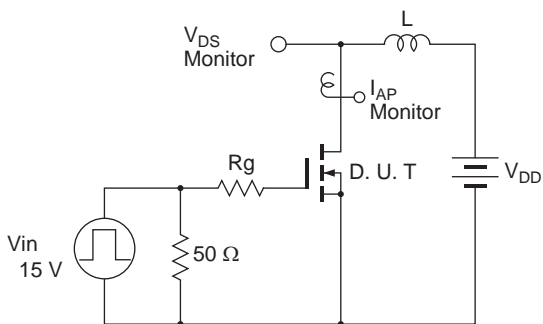
Reverse Drain Current vs. Source to Drain Voltage



Avalanche Energy vs. Channel Temperature Derating

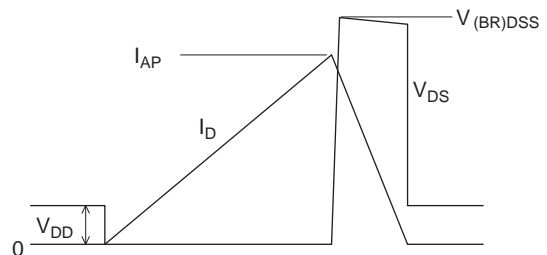


Avalanche Test Circuit

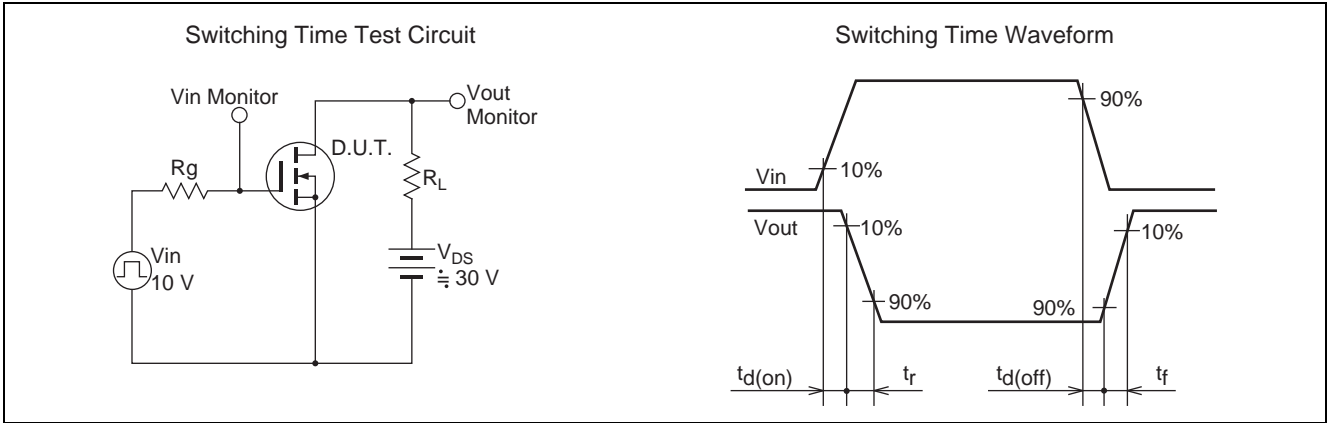


Avalanche Waveform

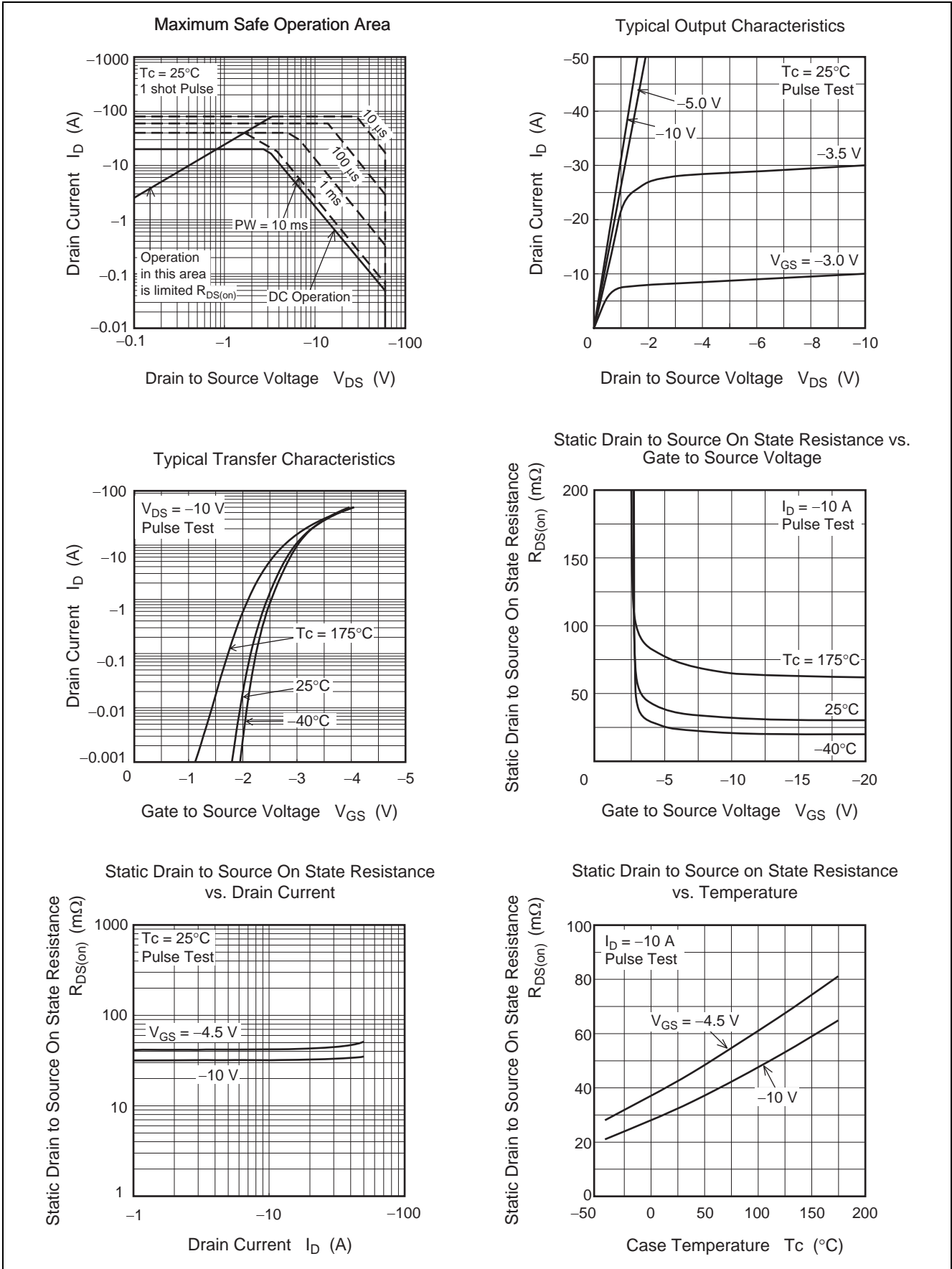
$$E_{AR} = \frac{1}{2} L \cdot I_{AP}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$



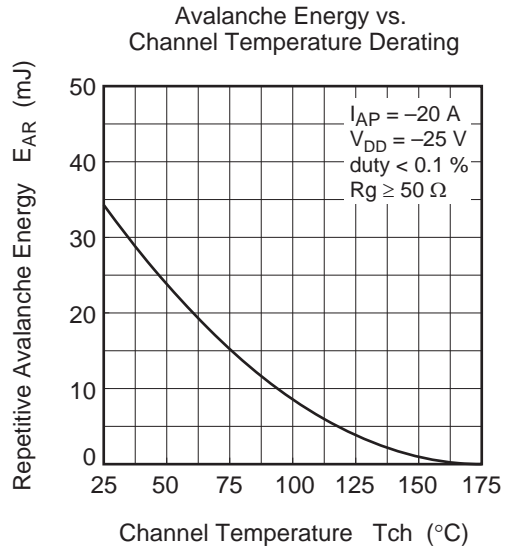
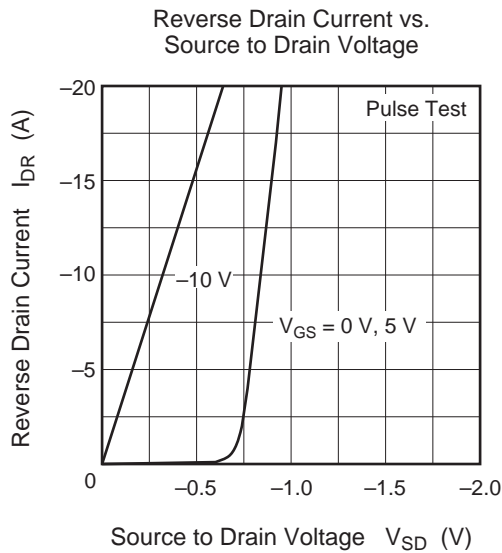
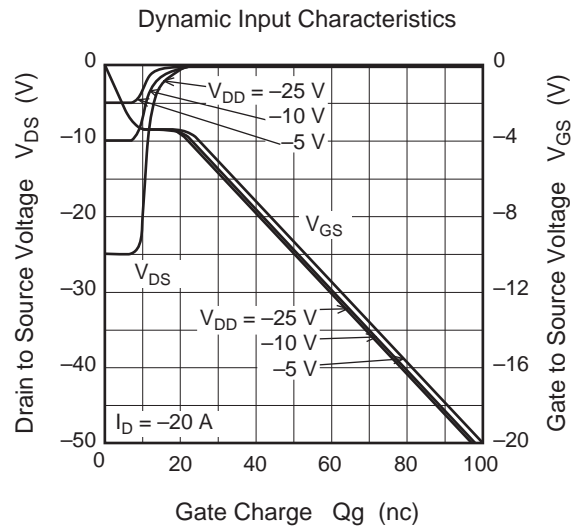
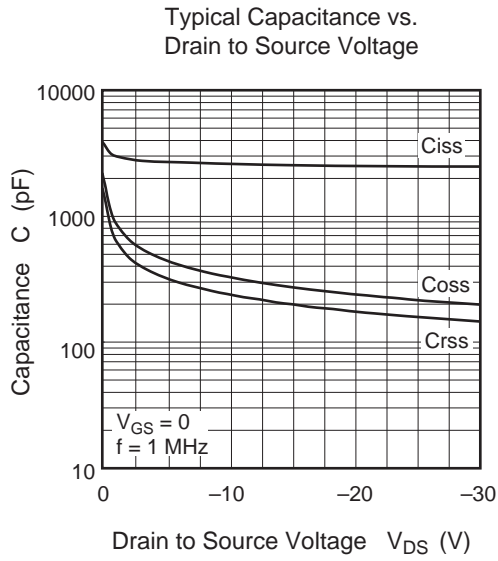
• MOS1, MOS2, MOS3 (N Channel)



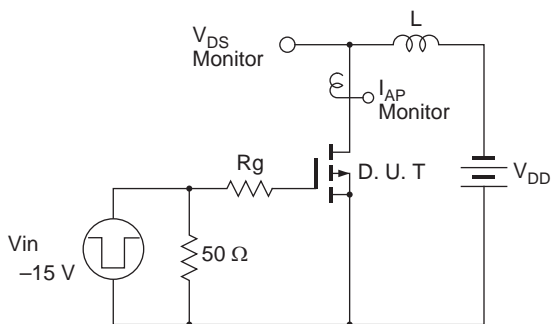
• MOS4, MOS5, MOS6 (P Channel)



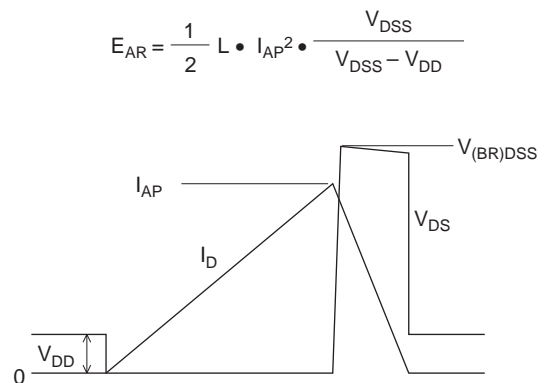
• MOS4, MOS5, MOS6 (P Channel)



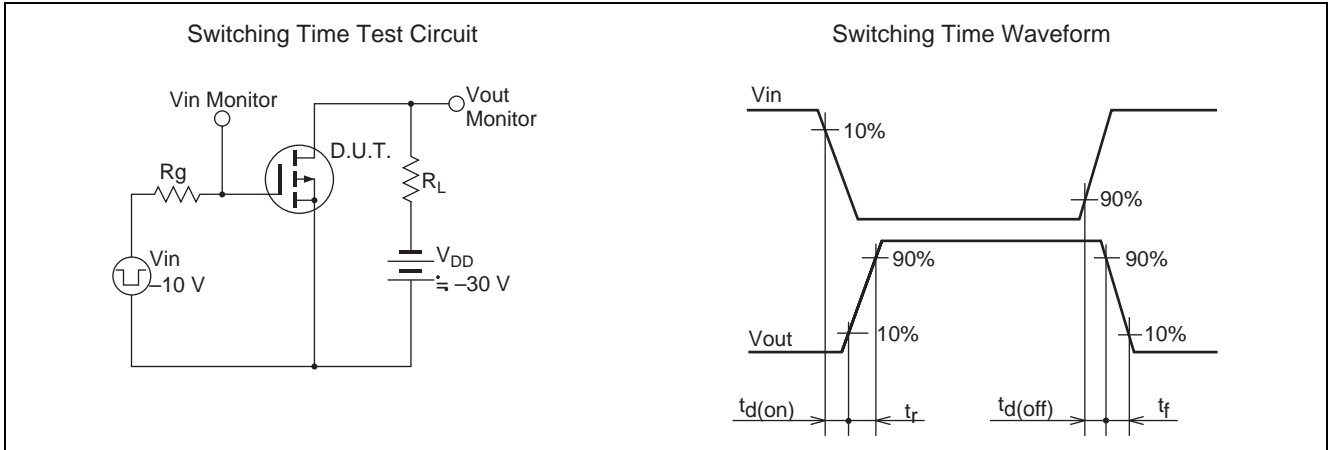
Avalanche Test Circuit



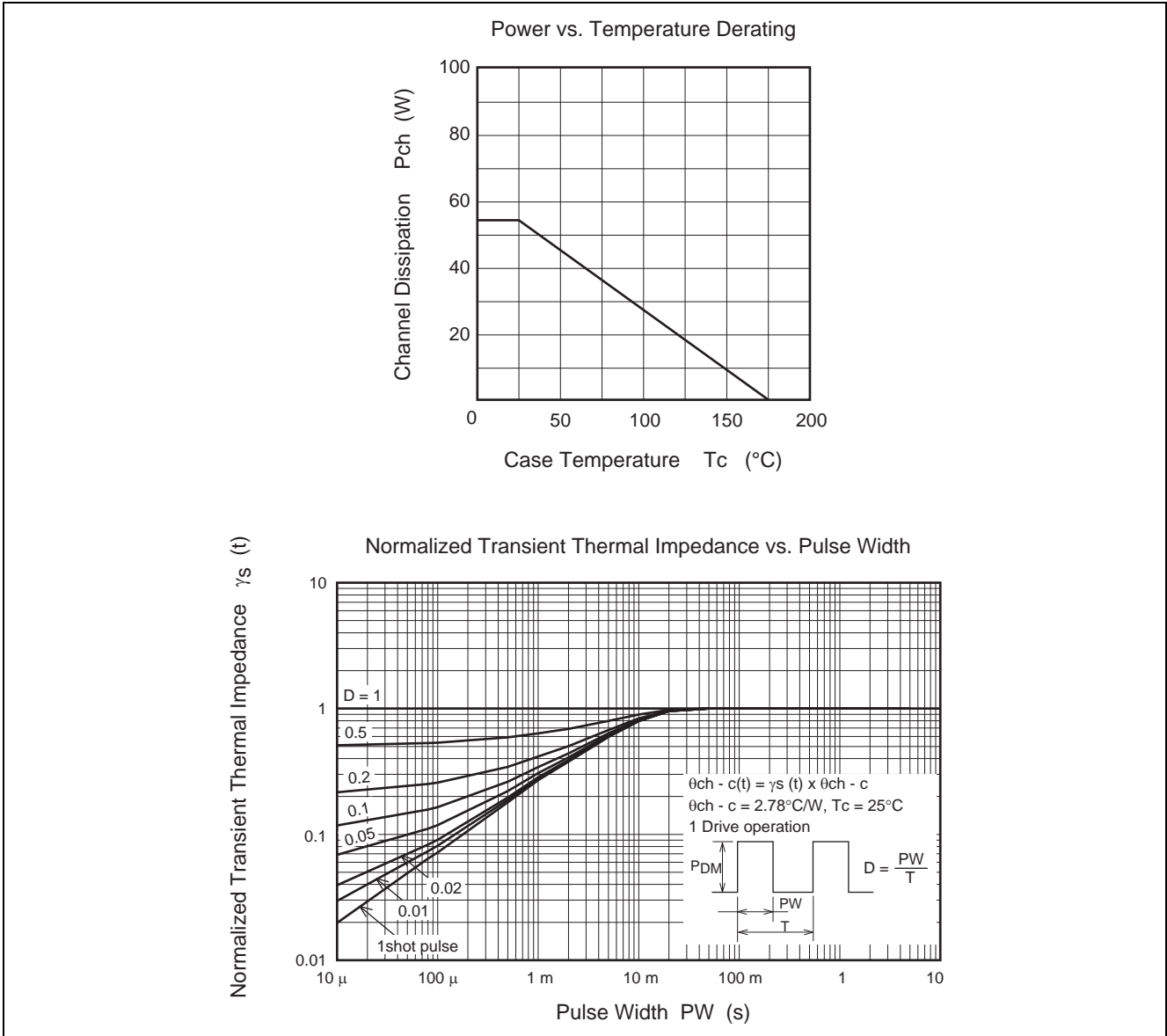
Avalanche Waveform



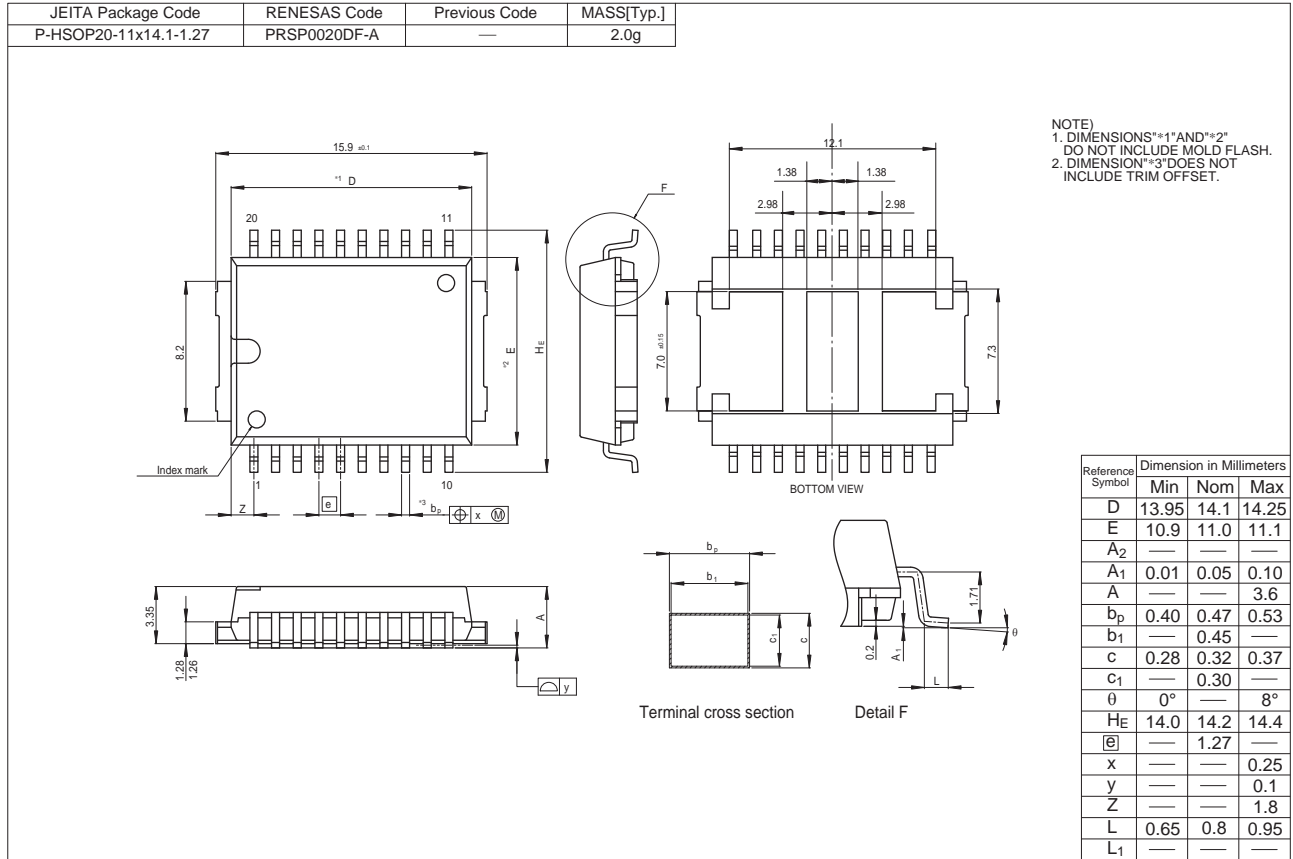
• MOS4, MOS5, MOS6 (P Channel)



• Common



Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJM0603JSC-00-12	700 pcs	Tray

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141