RF4C100BC

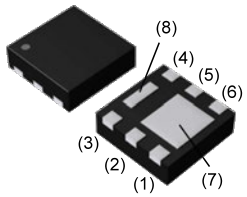
Pch -20V -10A Middle Power MOSFET

Datasheet

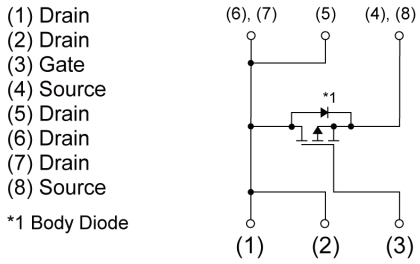
V_{DSS}	-20V
$R_{DS(on)}$(Max.)	15.6mΩ
I_D	±10A
P_D	2W

●Outline

HUML2020L8



●Inner circuit



●Features

1) Low on - resistance.
2) High Power small mold Package (HUML2020L8).
3) Pb-free lead plating ; RoHS compliant.
4) Halogen Free.

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8
	Basic ordering unit (pcs)	3000
	Taping code	TCR
	Marking	KH

●Application

Switching

Load switch

●Absolute maximum ratings (T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	-20	V
Continuous drain current	I_D	±10	A
Pulsed drain current	$I_{D,pulse}$ *2	±36	A
Gate - Source voltage	V_{GSS}	±8	V
Avalanche energy, single pulse	E_{AS} *3	15.2	mJ
Avalanche current	I_{AS} *3	-2.0	A
Power dissipation	P_D *4	2	W
Junction temperature	T_j	150	℃
Range of storage temperature	T_{stg}	-55 to +150	℃

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *4	-	-	62.5	℃/W

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = -1mA	-20	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	-10.3	-	mV/℃
Zero gate voltage drain current	I_{DSS}	V_{DS} = -20V, V_{GS} = 0V	-	-	-1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±8V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -1mA	-0.5	-	-1.2	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	I_D = -1mA referenced to 25℃	-	1.7	-	mV/℃
Static drain - source on - state resistance	$R_{DS(on)}$ *5	V_{GS} = -4.5V, I_D = -10A	-	12.0	15.6	mΩ
		V_{GS} = -2.5V, I_D = -10A	-	15.4	20.0	
		V_{GS} = -1.8V, I_D = -2.5A	-	23.5	37.6	
Gate input resistance	R_G	f=1MHz, open drain	-	4.2	-	Ω
Forward Transfer Admittance	$\|Y_{fs}\|$ *5	V_{DS} = -5V, I_D = -10A	12	-	-	S

*1 Vgs≧2.5V

*2 Pw ≦ 10μs, Duty cycle ≦ 1%

*3 Tr1: L ≃ 5mH, V_{DD} = -10V, R_G = 25Ω, STARTING T_j = 25℃ Fig.3-1,3-2

*4 MOUNTED ON 40mm×40mm×0.8mm Cu BOARD

*5 Pulsed

●Electrical characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	1660	-	pF
Output capacitance	C_{oss}	V_{DS} = -10V	-	320	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	280	-	
Turn - on delay time	$t_{d(on)}$ *5	V_{DD} ≃ -10V, V_{GS} = -4.5V	-	16	-	ns
Rise time	t_r *5	I_D = -5.0A	-	43	-	
Turn - off delay time	$t_{d(off)}$ *5	R_L ≃ 2.0Ω	-	110	-	
Fall time	t_f *5	R_G = 10Ω	-	86	-	

●Gate charge characteristics (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *5	V_{DD} ≃ -10V, I_D = -10A, V_{GS} = -4.5V	-	23.5	-	nC
Gate - Source charge	Q_{gs} *5		-	2.6	-	
Gate - Drain charge	Q_{gd} *5		-	8.0	-	

●Body diode electrical characteristics (Source-Drain) (T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	I_S	T_a = 25°C	-	-	-1.67	A
Body diode pulse current	I_{SP} *2		-	-	-36	A
Forward voltage	V_{SD} *5	V_{GS} = 0V, I_S = -1.67A	-	-	-1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

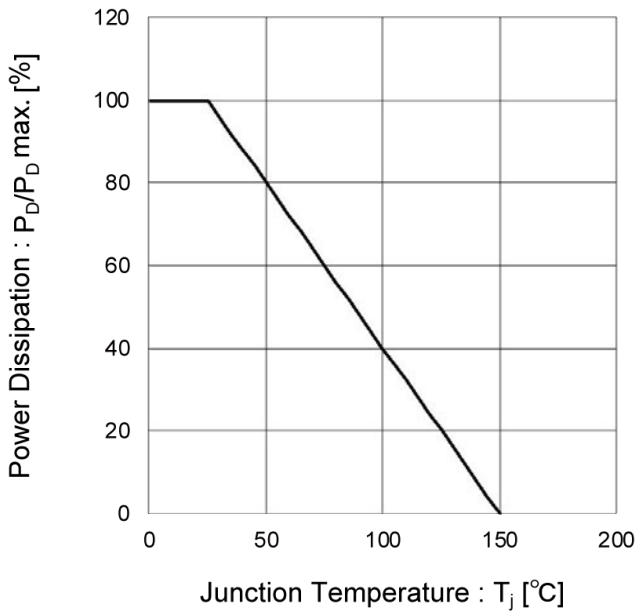


Fig.2 Maximum Safe Operating Area

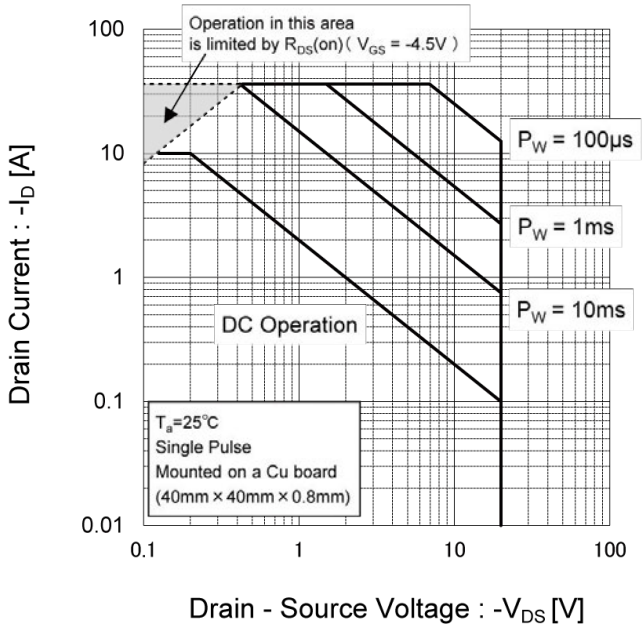


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

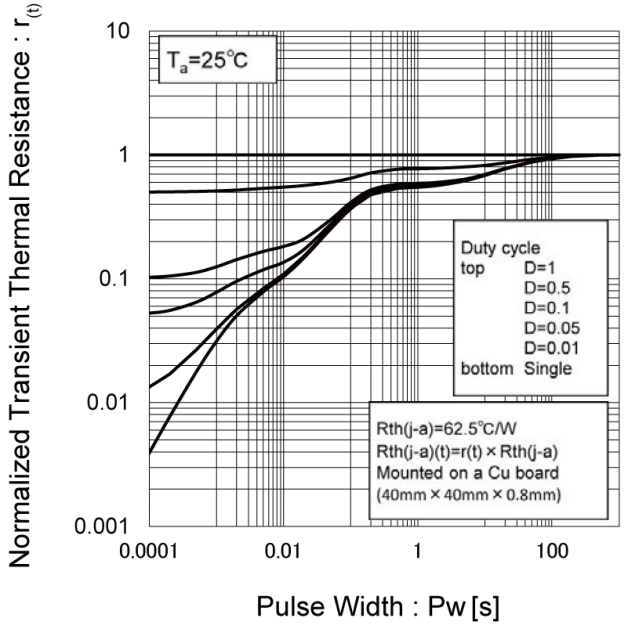
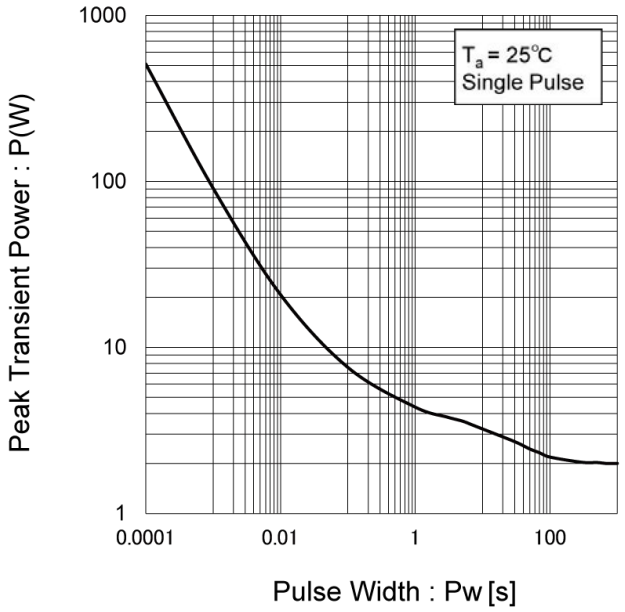


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

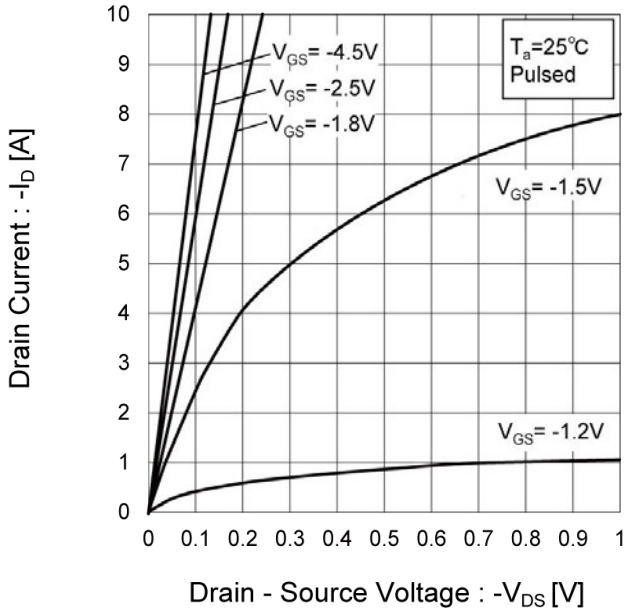


Fig.6 Typical Output Characteristics(II)

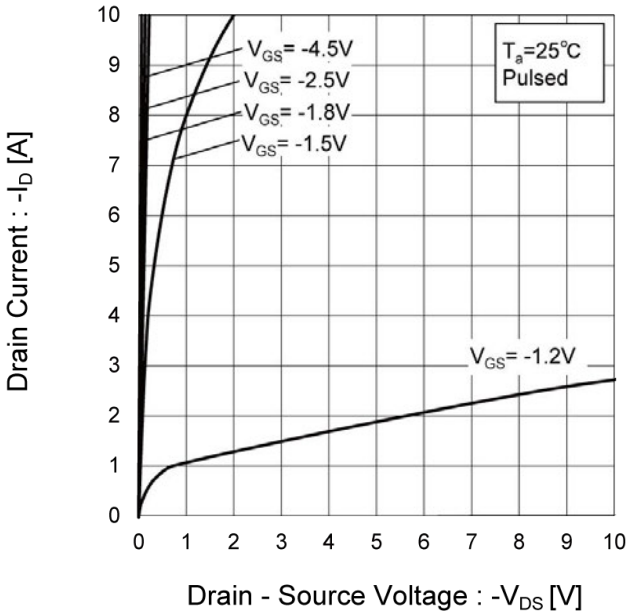
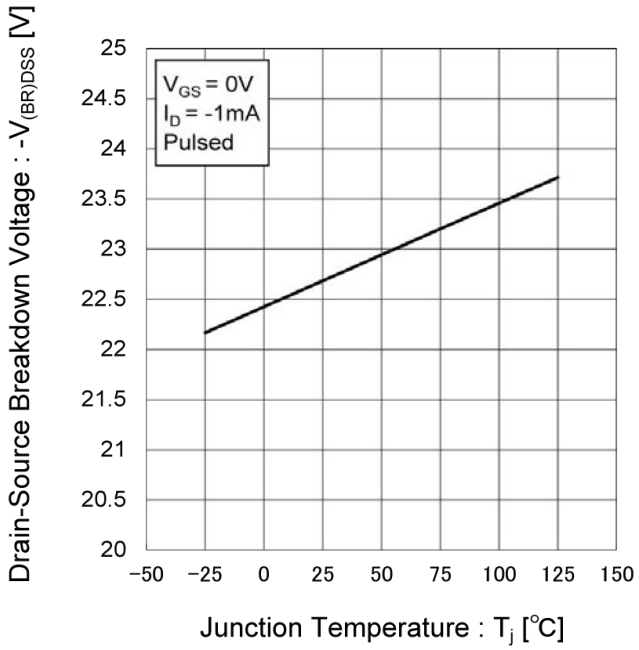


Fig.7 Breakdown Voltage vs. Junction Temperature



●Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

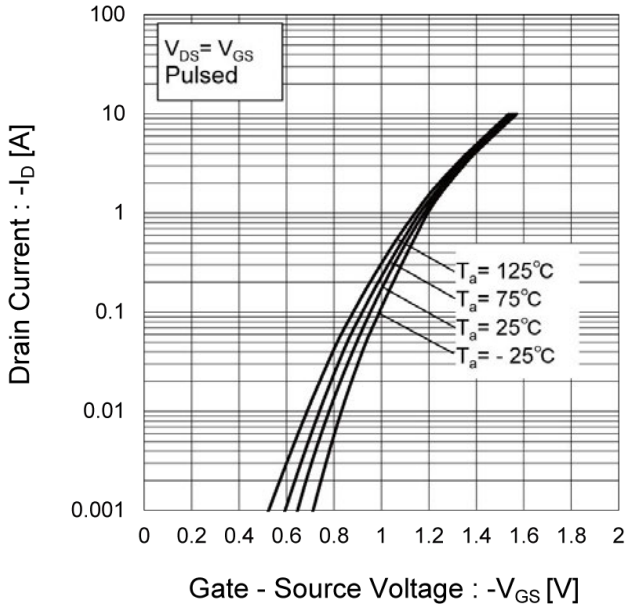


Fig.9 Gate Threshold Voltage vs. Junction Temperature

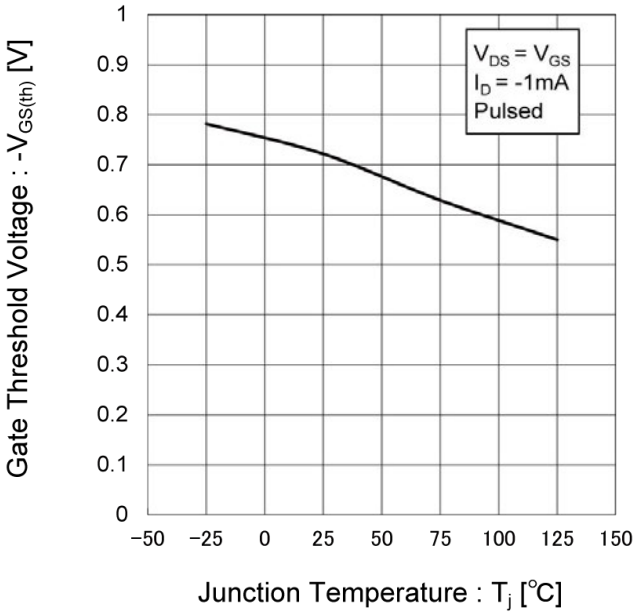
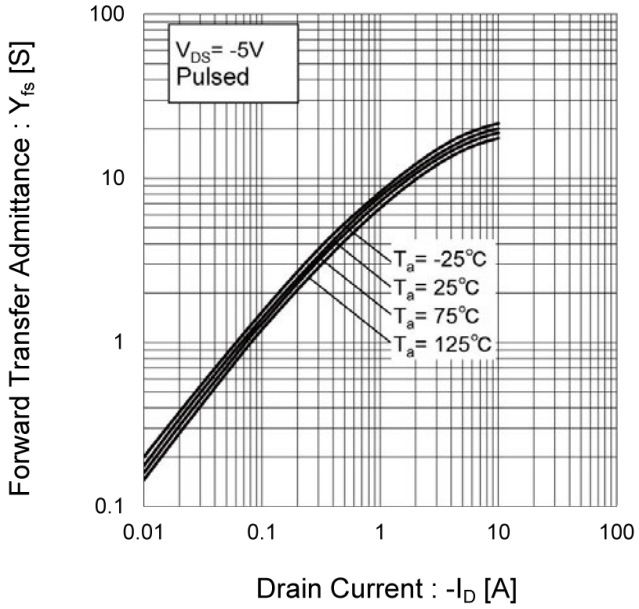


Fig.10 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.11 Drain Current Derating Curve

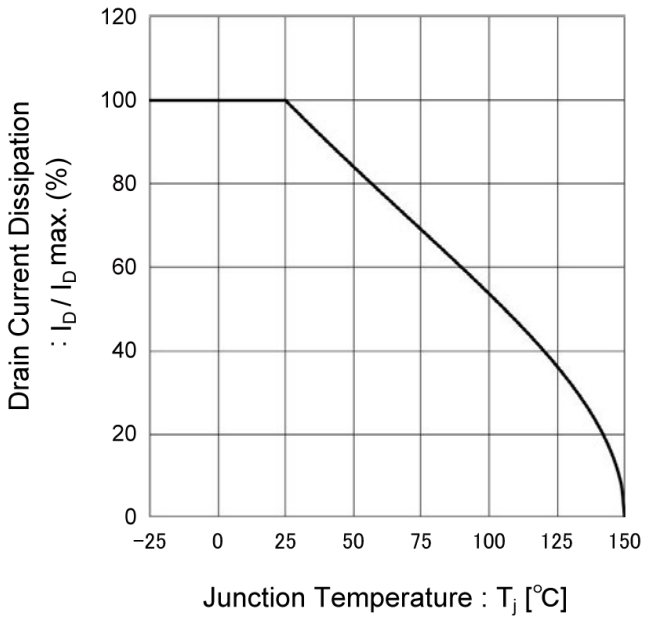


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

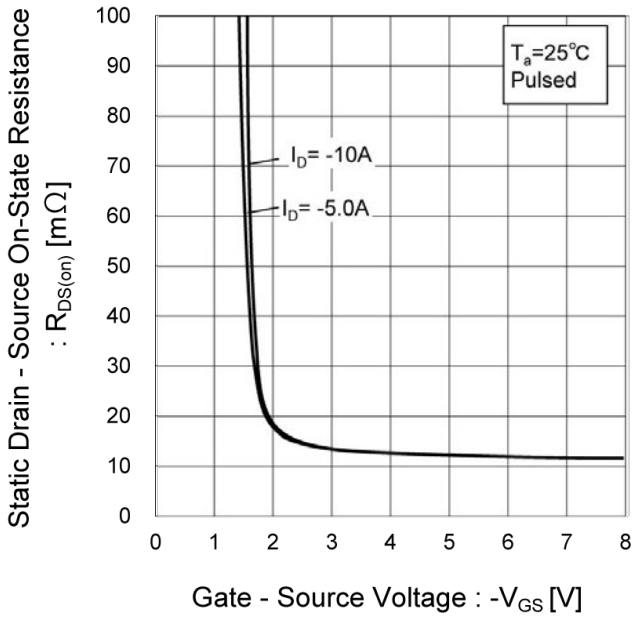
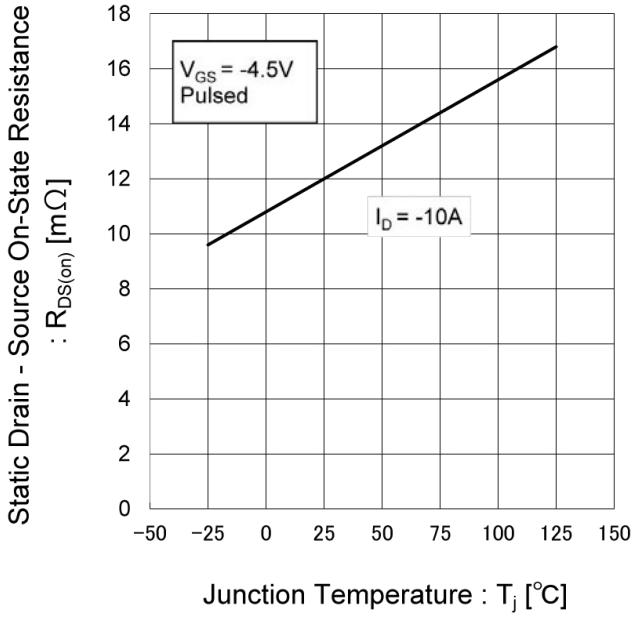


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(I)

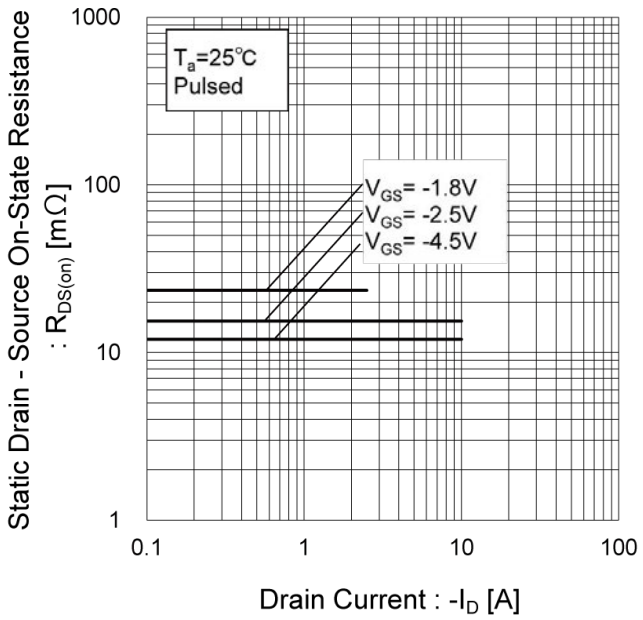


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

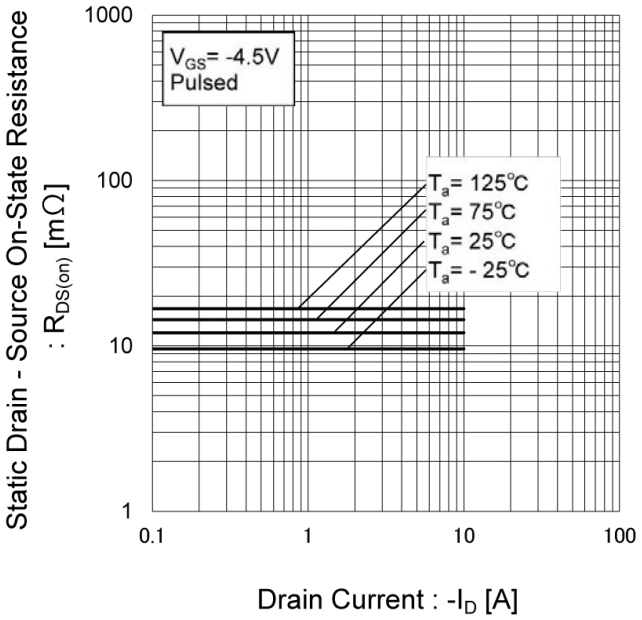


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)

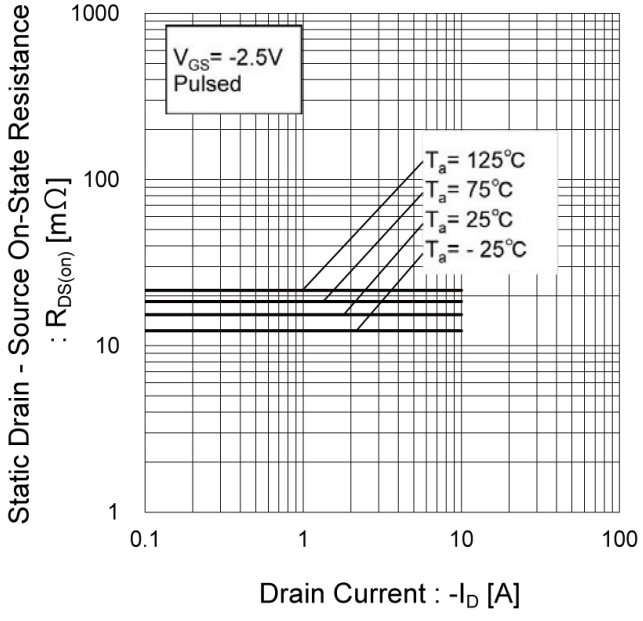
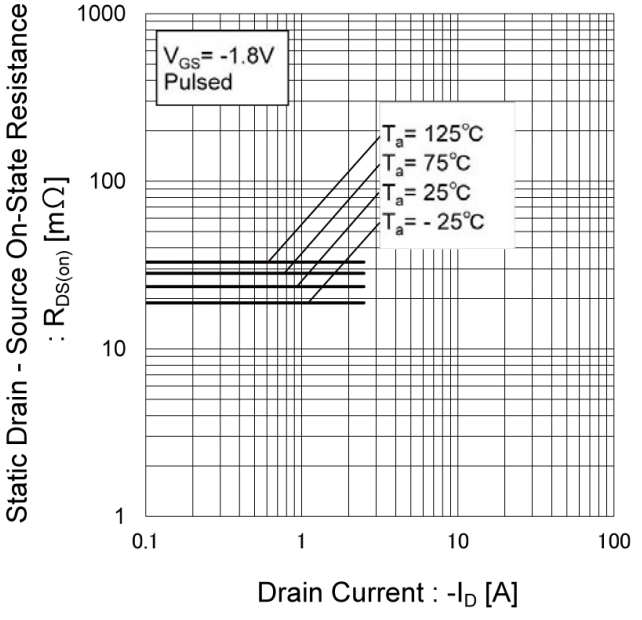


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(Ⅳ)



●Electrical characteristic curves

Fig.18 Typical Capacitance vs. Drain - Source Voltage

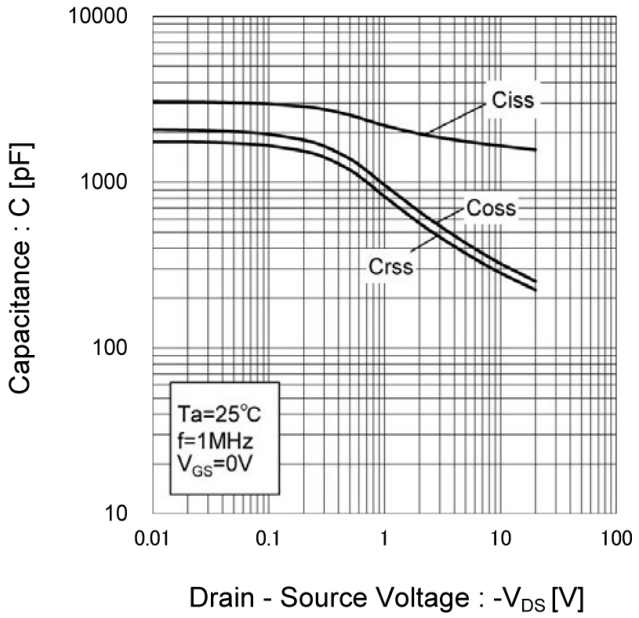


Fig.19 Switching Characteristics

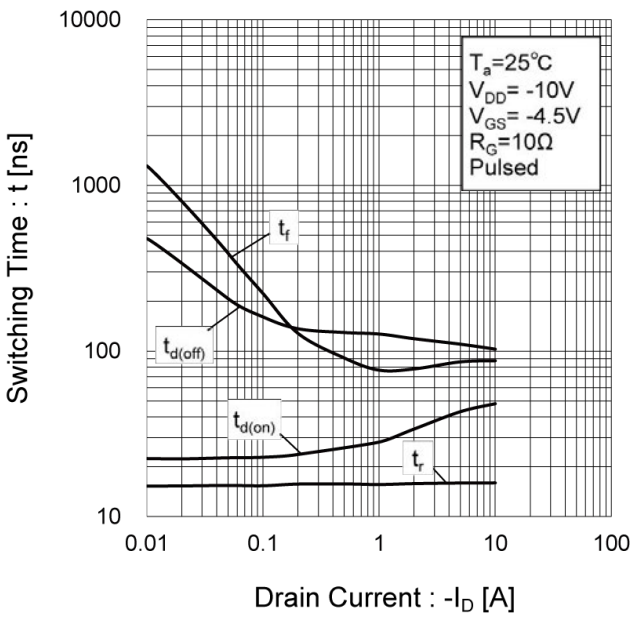


Fig.20 Dynamic Input Characteristics

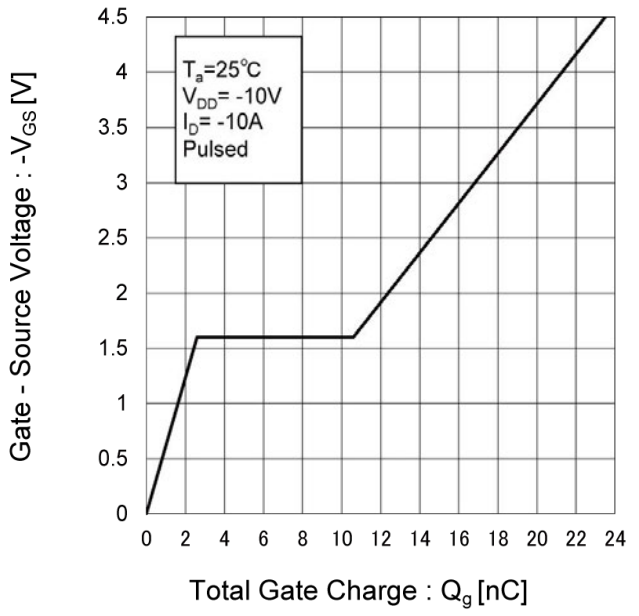
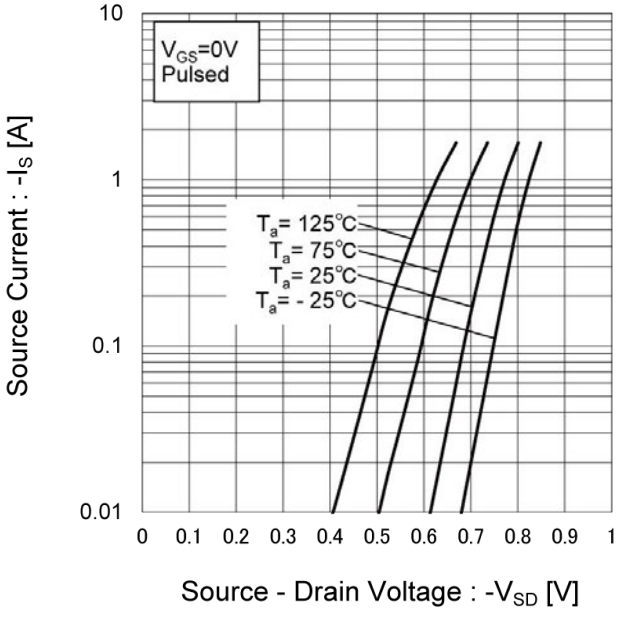


Fig.21 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

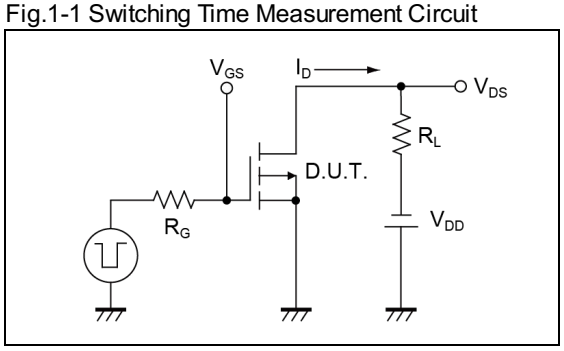


Fig.1-2 Switching Waveforms

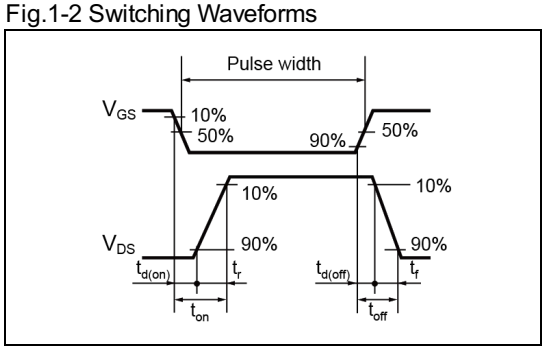


Fig.2-1 Gate Charge Measurement Circuit

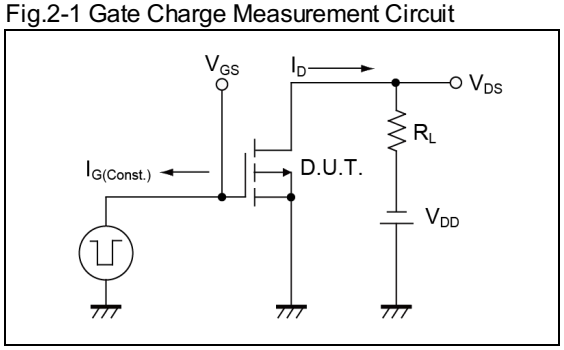


Fig.2-2 Gate Charge Waveform

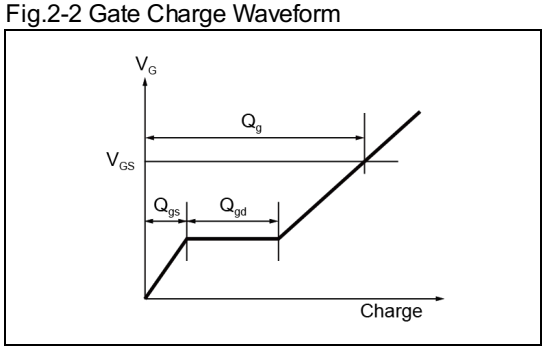


Fig.3-1 Avalanche Measurement Circuit

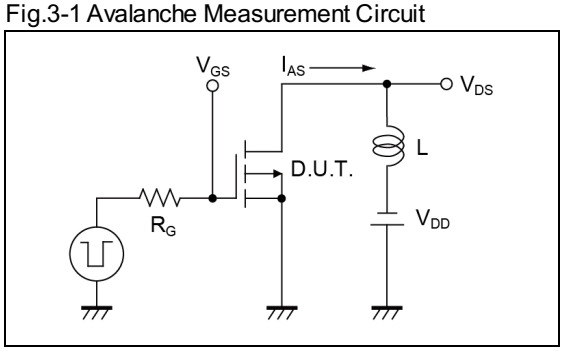
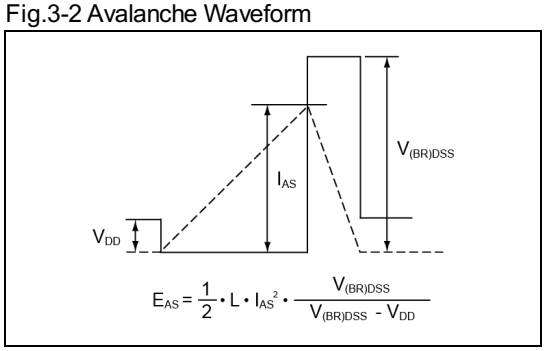


Fig.3-2 Avalanche Waveform

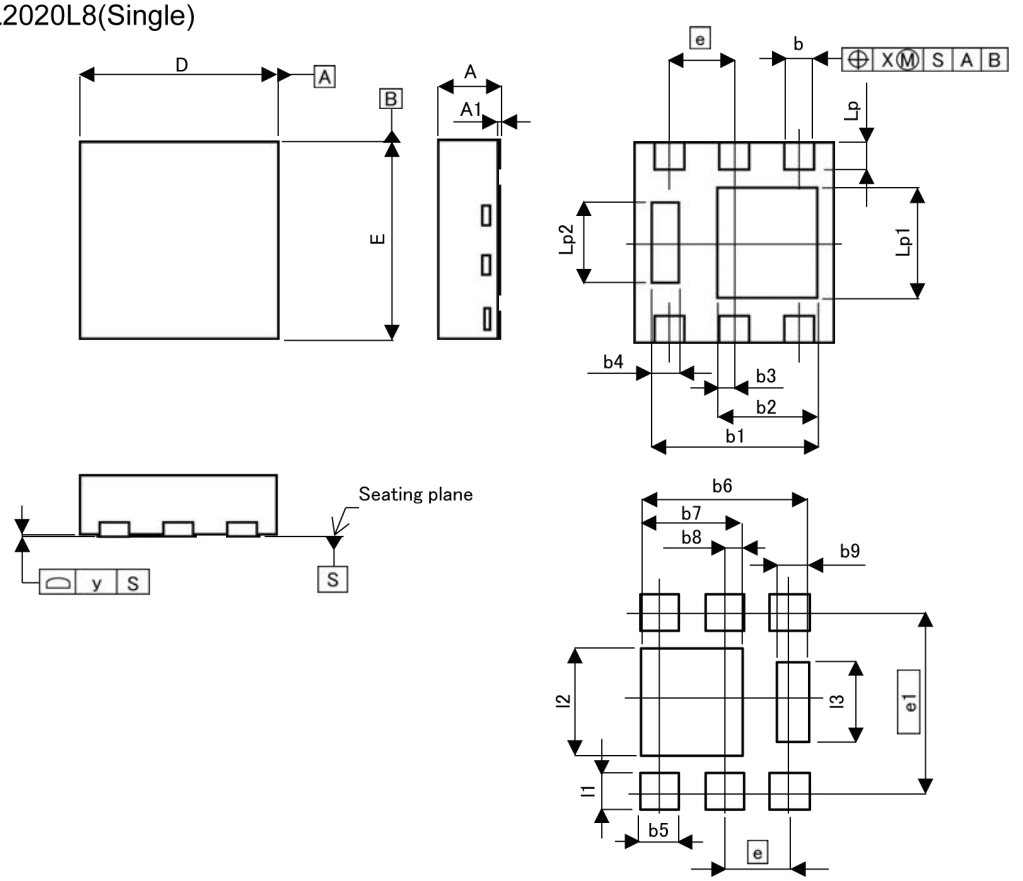


●Notice

This product might cause chip aging and breakdown under the large electrified environment.
Please consider to design ESD protection circuit.

●Dimensions

HUML2020L8(Single)



Pattern of terminal position areas
[Not a recommended pattern of soldering pads]

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.55	0.65	0.022	0.026
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
b1	1.55	1.75	0.061	0.069
b2	0.95	1.05	0.037	0.041
b3	0.175		0.007	
b4	0.20	0.30	0.008	0.012
D	1.90	2.10	0.075	0.083
E	1.90	2.10	0.075	0.083
e	0.65		0.026	
Lp	0.225	0.325	0.009	0.013
Lp1	1.05	1.15	0.041	0.045
Lp2	0.75	0.85	0.030	0.033
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b5	-	0.45	-	0.018
b6	-	1.75	-	0.069
b7	-	1.05	-	0.041
b8	0.175		0.007	
b9	-	0.30	-	0.012
e1	1.725		0.068	
l1	-	0.425	-	0.017
l2	-	1.15	-	0.045
l3	-	0.85	-	0.033

Dimension in mm/inches

Notes

1) The information contained herein is subject to change without notice.

2) Before you use our Products, please contact our sales representative and verify the latest specifications :

3) Although ROHM is continuously working to improve product reliability and quality, semiconductors can break down and malfunction due to various factors.
Therefore, in order to prevent personal injury or fire arising from failure, please take safety measures such as complying with the derating characteristics, implementing redundant and fire prevention designs, and utilizing backups and fail-safe procedures. ROHM shall have no responsibility for any damages arising out of the use of our Poducts beyond the rating specified by ROHM.

4) Examples of application circuits, circuit constants and any other information contained herein are provided only to illustrate the standard usage and operations of the Products. The peripheral conditions must be taken into account when designing circuits for mass production.

5) The technical information specified herein is intended only to show the typical functions of and examples of application circuits for the Products. ROHM does not grant you, explicitly or implicitly, any license to use or exercise intellectual property or other rights held by ROHM or any other parties. ROHM shall have no responsibility whatsoever for any dispute arising out of the use of such technical information.

6) The Products are intended for use in general electronic equipment (i.e. AV/OA devices, communication, consumer systems, gaming/entertainment sets) as well as the applications indicated in this document.

7) The Products specified in this document are not designed to be radiation tolerant.

8) For use of our Products in applications requiring a high degree of reliability (as exemplified below), please contact and consult with a ROHM representative : transportation equipment (i.e. cars, ships, trains), primary communication equipment, traffic lights, fire/crime prevention, safety equipment, medical systems, servers, solar cells, and power transmission systems.

9) Do not use our Products in applications requiring extremely high reliability, such as aerospace equipment, nuclear power control systems, and submarine repeaters.

10) ROHM shall have no responsibility for any damages or injury arising from non-compliance with the recommended usage conditions and specifications contained herein.

11) ROHM has used reasonable care to ensur the accuracy of the information contained in this document. However, ROHM does not warrants that such information is error-free, and ROHM shall have no responsibility for any damages arising from any inaccuracy or misprint of such information.

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