

$V_{DSS}$	30V
$R_{DS(on)}(Max.)$	11.1m $\Omega$
$I_D$	$\pm 11A$
$P_D$	2W

### ●Features

- 1) Low on - resistance.
- 2) High power small mold package (HUML2020L8).
- 3) Pb-free lead plating ; RoHS compliant
- 4) 100% Rg and UIS tested.
- 5) Halogen free100%

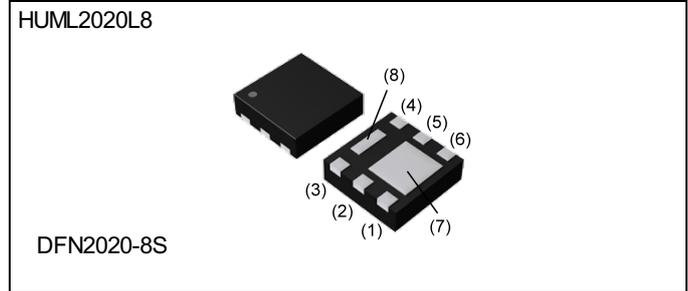
### ●Application

Switching

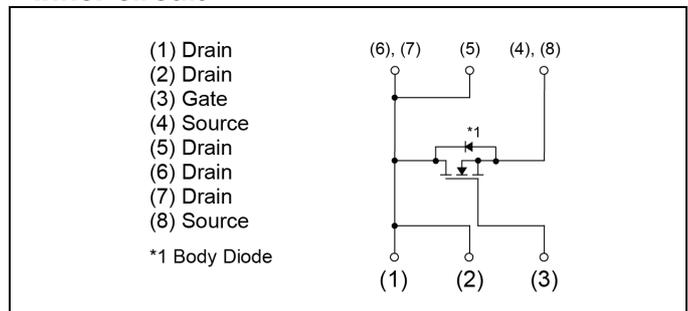
### ●Absolute maximum ratings ( $T_a = 25^\circ C$ )

Parameter	Symbol	Value	Unit
Drain - Source voltage	$V_{DSS}$	30	V
Continuous drain current	$I_D$	$\pm 11$	A
Pulsed drain current	$I_{D,pulse}^{*1}$	$\pm 44$	A
Gate - Source voltage	$V_{GSS}$	$\pm 20$	V
Power dissipation	$P_D^{*2}$	2	W
Junction temperature	$T_j$	150	$^\circ C$
Range of storage temperature	$T_{stg}$	-55 to +150	$^\circ C$

### ●Outline



### ●Inner circuit



### ●Packaging specifications

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

## ● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	$R_{thJA}^{*2}$	-	-	62.5	°C/W

● Electrical characteristics ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 1mA$	30	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = 1mA$ referenced to $25^\circ\text{C}$	-	21	-	mV/°C
Zero gate voltage drain current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	μA
Gate - Source leakage current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	-	2.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to $25^\circ\text{C}$	-	-3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*3}$	$V_{GS} = 10V, I_D = 11A$	-	8.5	11.1	mΩ
		$V_{GS} = 4.5V, I_D = 11A$	-	11.8	15.4	
Gate input resistance	$R_G$	f=1MHz, open drain	-	1.1	-	Ω
Forward Transfer Admittance	$ Y_{fs} ^{*3}$	$V_{DS} = 5V, I_D = 11A$	6	-	-	S

\*1  $P_w \leq 10\mu s$ , Duty cycle  $\leq 1\%$

\*2 Mounted on a Cu Board (40mm×40mm×0.8mm)

\*3 Pulsed

**● Electrical characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	$C_{iss}$	$V_{GS} = 0V$	-	1200	-	pF
Output capacitance	$C_{oss}$	$V_{DS} = 15V$	-	170	-	
Reverse transfer capacitance	$C_{rss}$	$f = 1\text{MHz}$	-	130	-	
Turn - on delay time	$t_{d(on)}^{*3}$	$V_{DD} \approx 15V, V_{GS} = 10V$	-	14.0	-	ns
Rise time	$t_r^{*3}$	$I_D = 5.5A$	-	12.0	-	
Turn - off delay time	$t_{d(off)}^{*3}$	$R_L \approx 2.7\Omega$	-	43.0	-	
Fall time	$t_f^{*3}$	$R_G = 10\Omega$	-	11.0	-	

**● Gate charge characteristics** ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions		Values			Unit	
				Min.	Typ.	Max.		
Total gate charge	$Q_g^{*3}$	$V_{DD} \approx 15V$	$I_D = 11A$	$V_{GS} = 10V$	-	24	-	nC
Gate - Source charge	$Q_{gs}^{*3}$			$V_{GS} = 4.5V$	-	12	-	
Gate - Drain charge	$Q_{gd}^{*3}$			$V_{GS} = 4.5V$	-	4.6	-	
					-	4.1	-	

**● Body diode electrical characteristics** (Source-Drain) ( $T_a = 25^\circ\text{C}$ )

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Body diode continuous forward current	$I_S$	$T_a = 25^\circ\text{C}$	-	-	1.67	A
Body diode pulse current	$I_{SP}^{*1}$		-	-	44	A
Forward voltage	$V_{SD}^{*3}$	$V_{GS} = 0V, I_S = 1.67A$	-	-	1.2	V

● Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

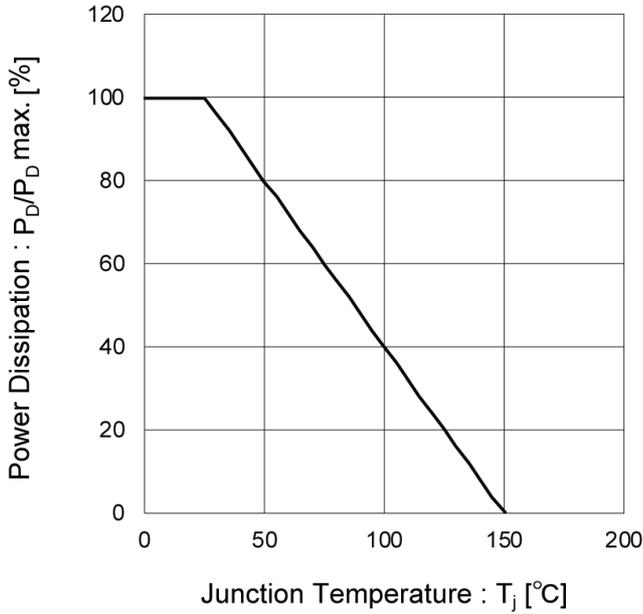


Fig.2 Maximum Safe Operating Area

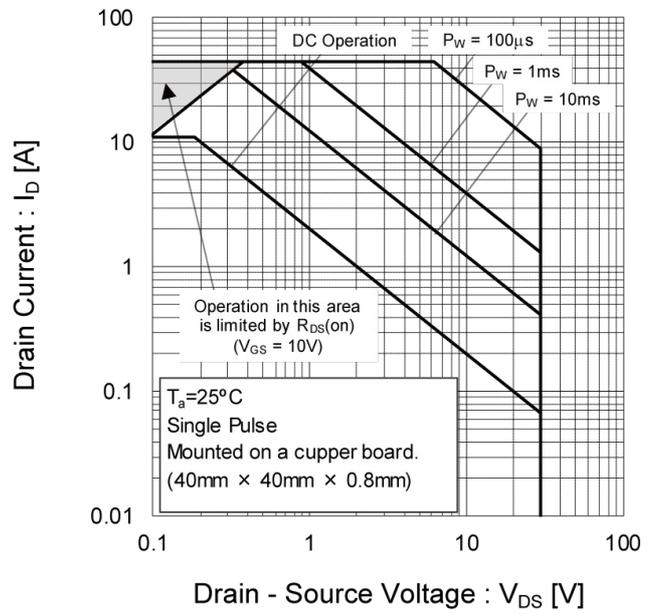


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

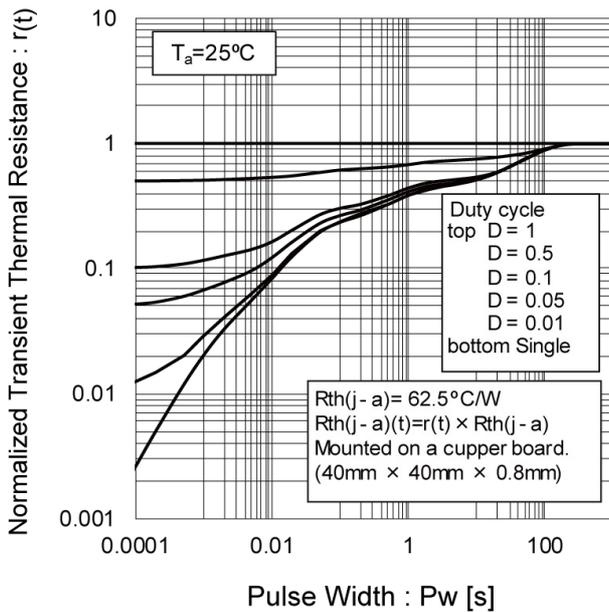
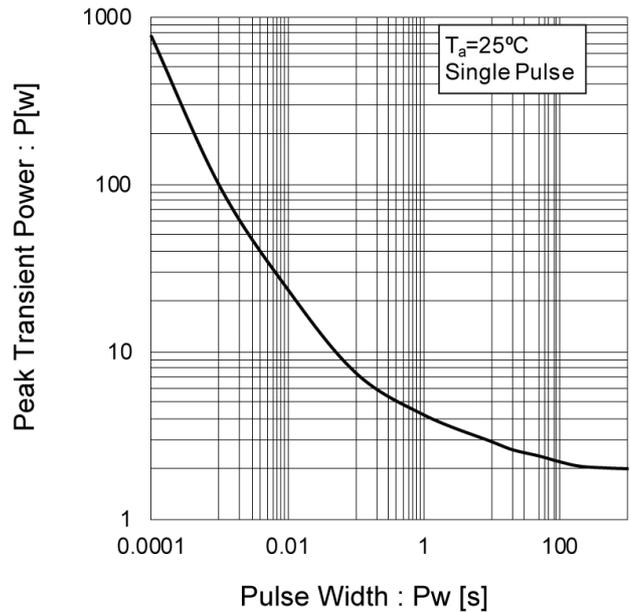


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

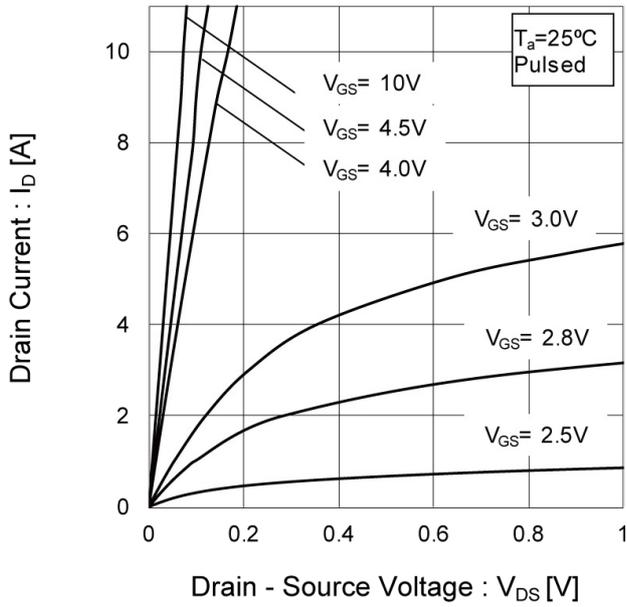


Fig.6 Typical Output Characteristics(II)

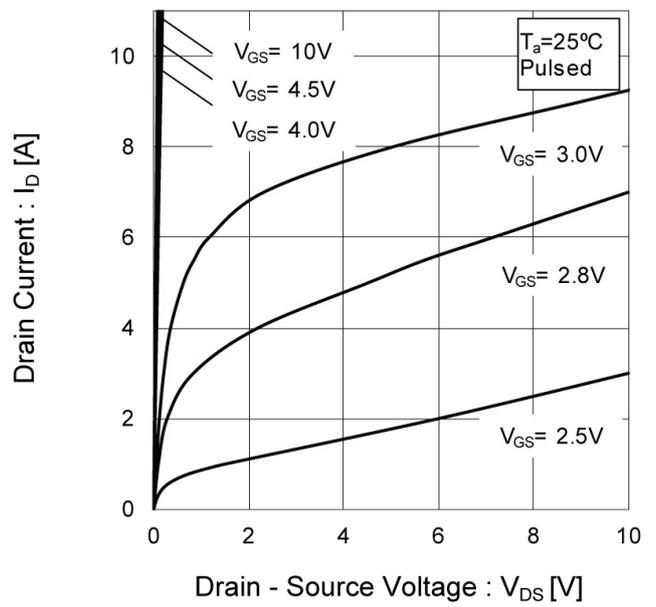


Fig.7 Breakdown Voltage vs. Junction Temperature

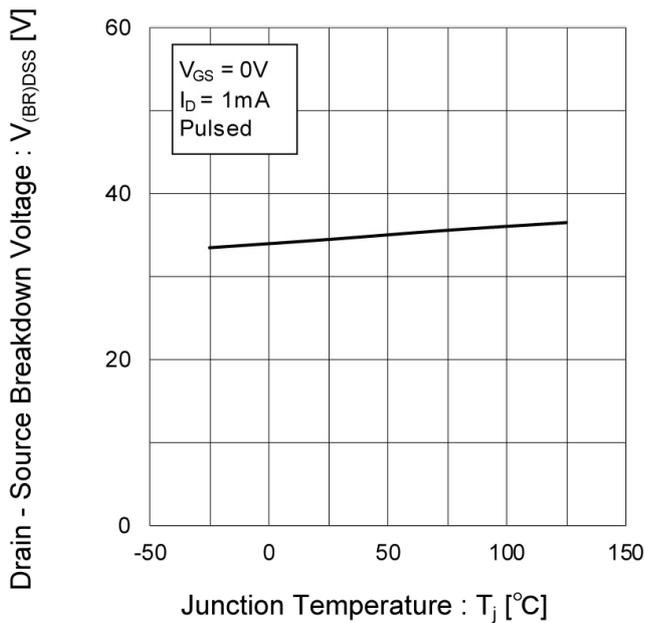
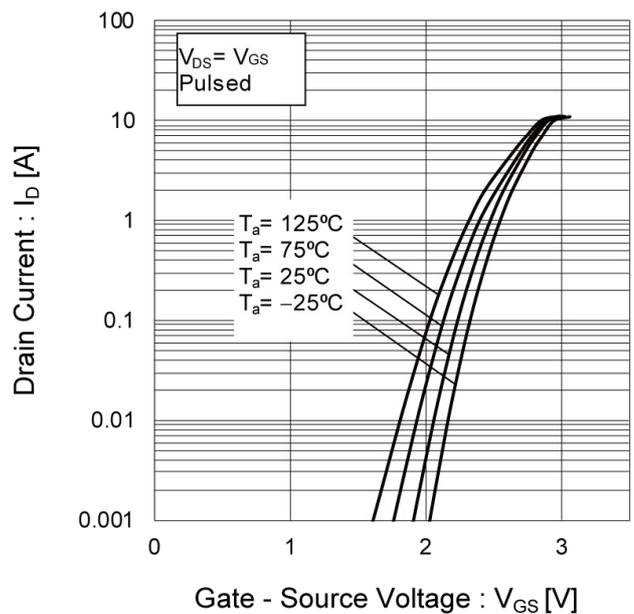


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

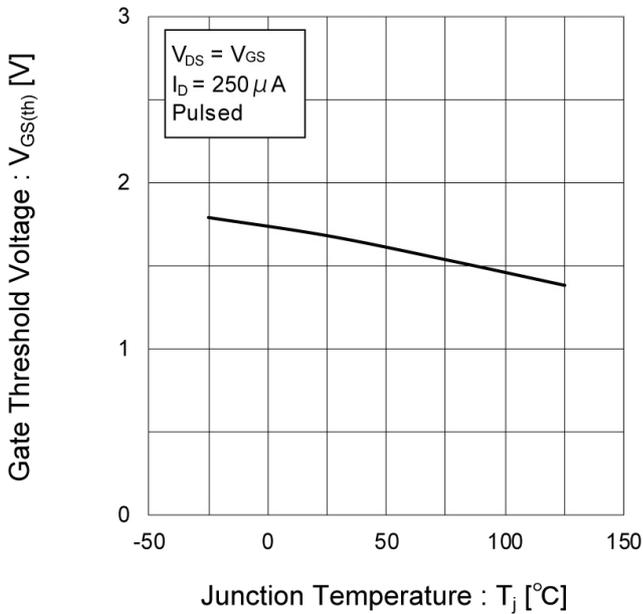


Fig.10 Forward Transfer Admittance vs. Drain Current

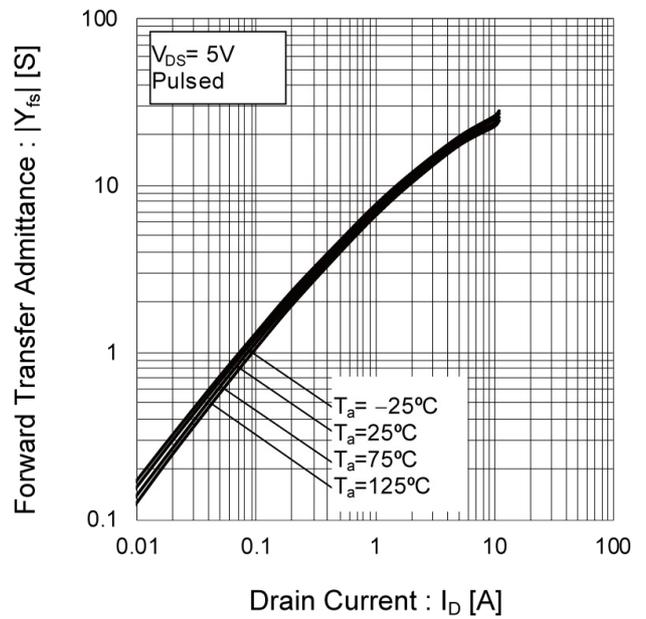


Fig.11 Drain Current Derating Curve

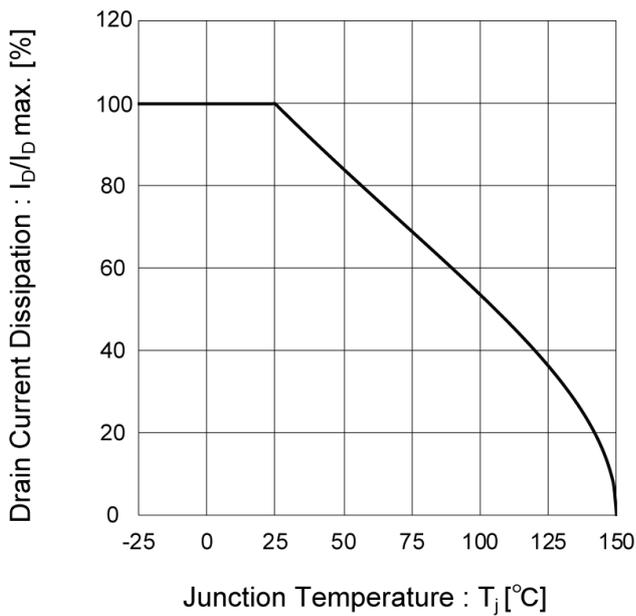
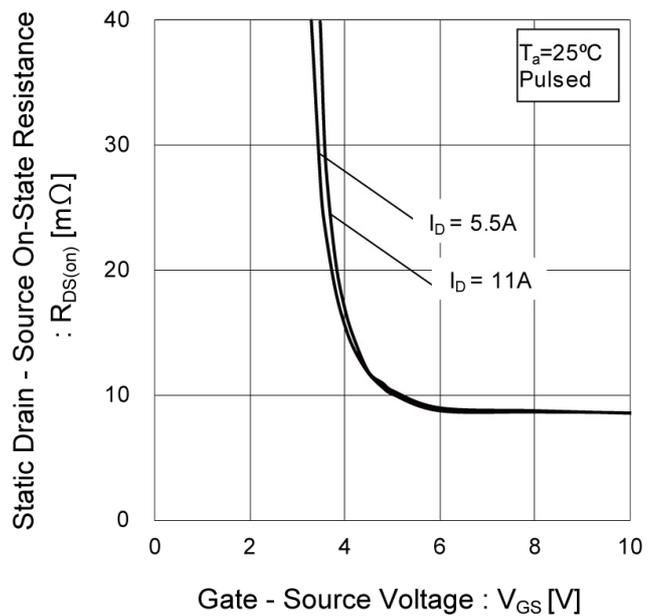


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



● Electrical characteristic curves

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

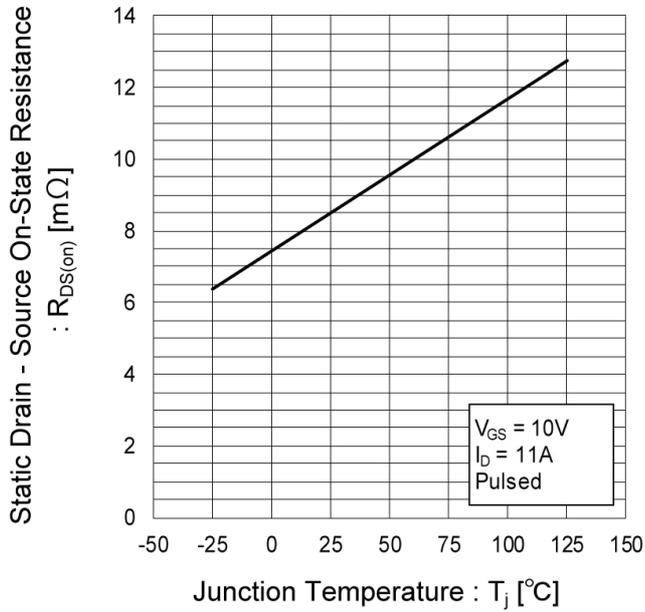


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current (I)

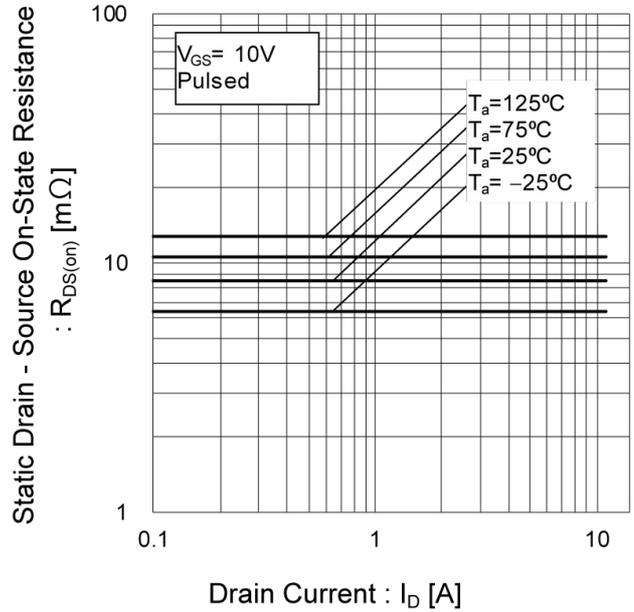
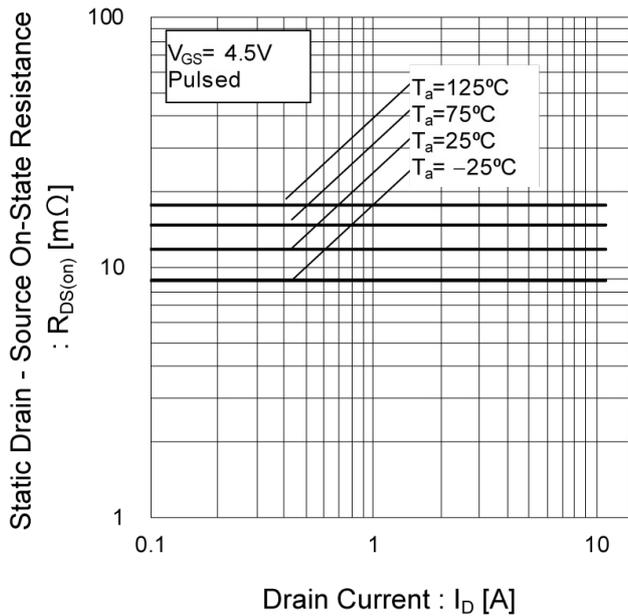


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

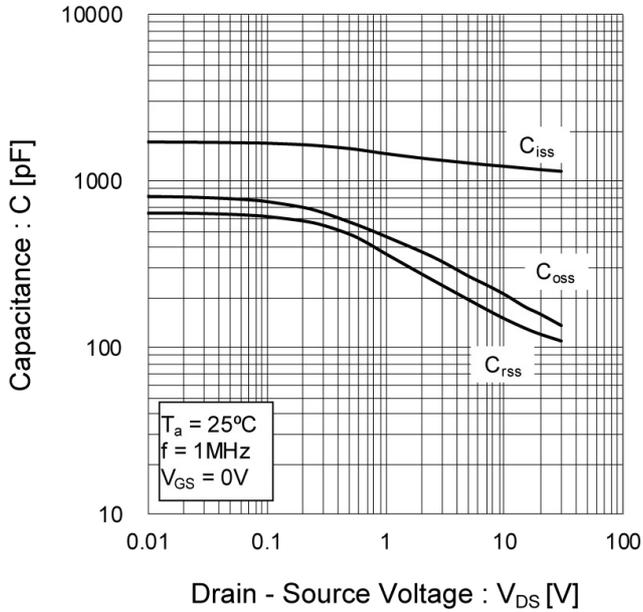


Fig.17 Switching Characteristics

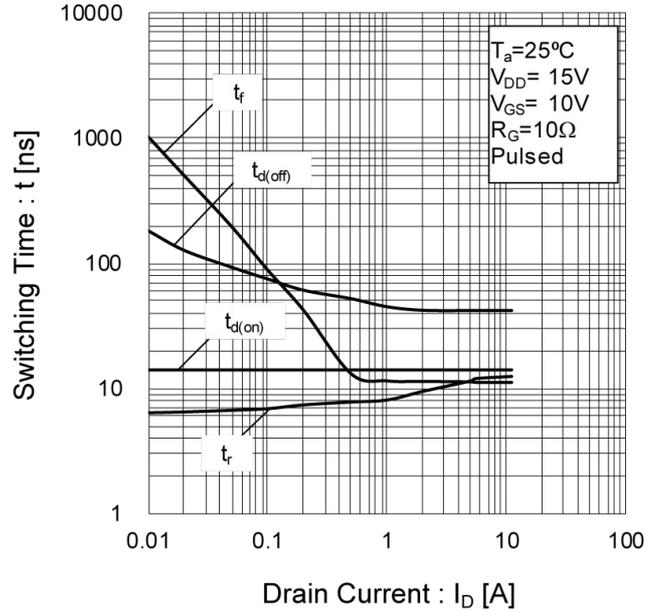


Fig.18 Dynamic Input Characteristics

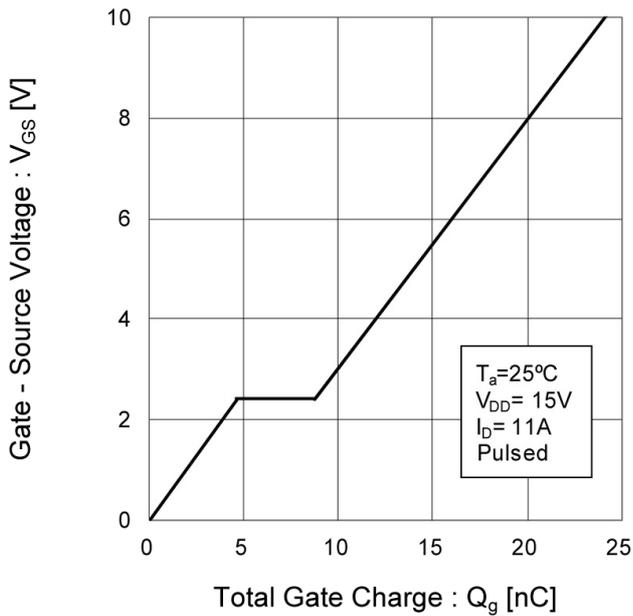
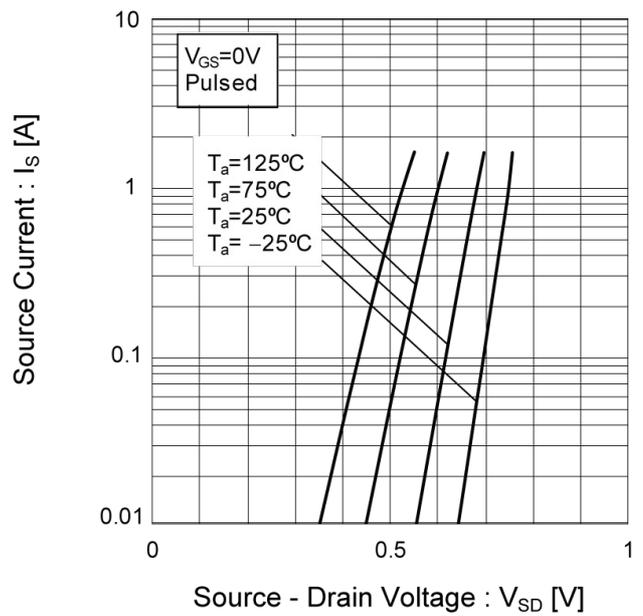


Fig.19 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig. 1-1 SWITCHING TIME MEASUREMENT CIRCUIT

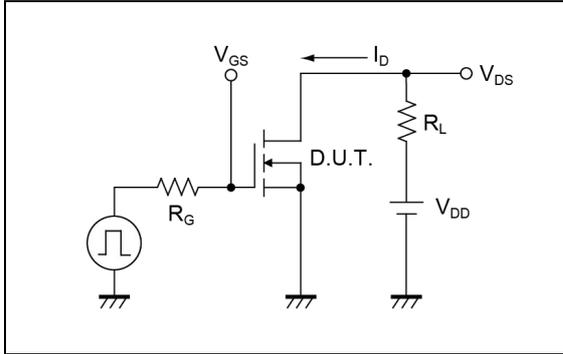


Fig. 1-2 SWITCHING WAVEFORMS

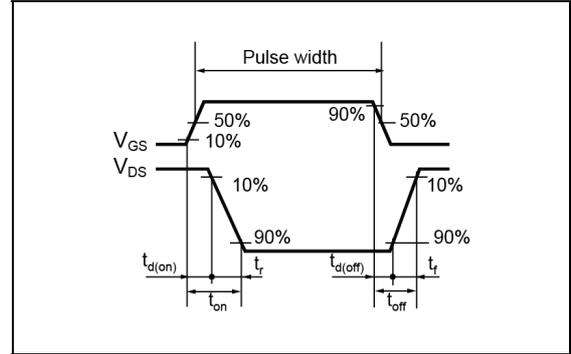


Fig. 2-1 GATE CHARGE MEASUREMENT CIRCUIT

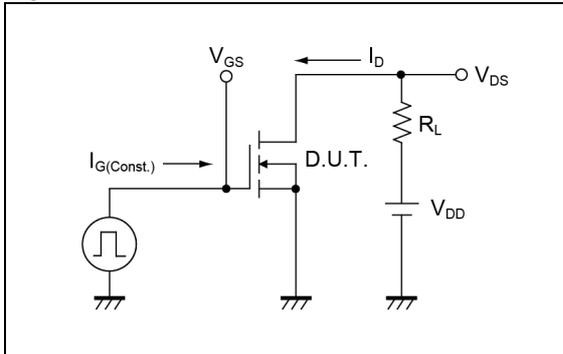
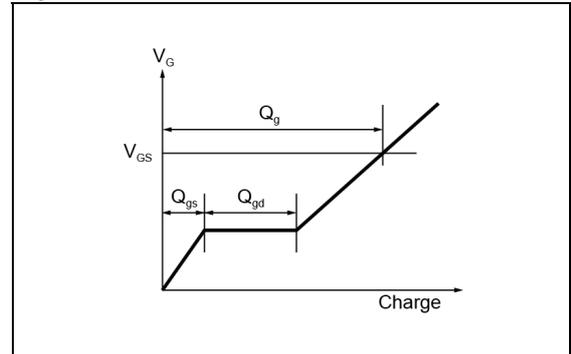


Fig. 2-2 GATE CHARGE WAVEFORM



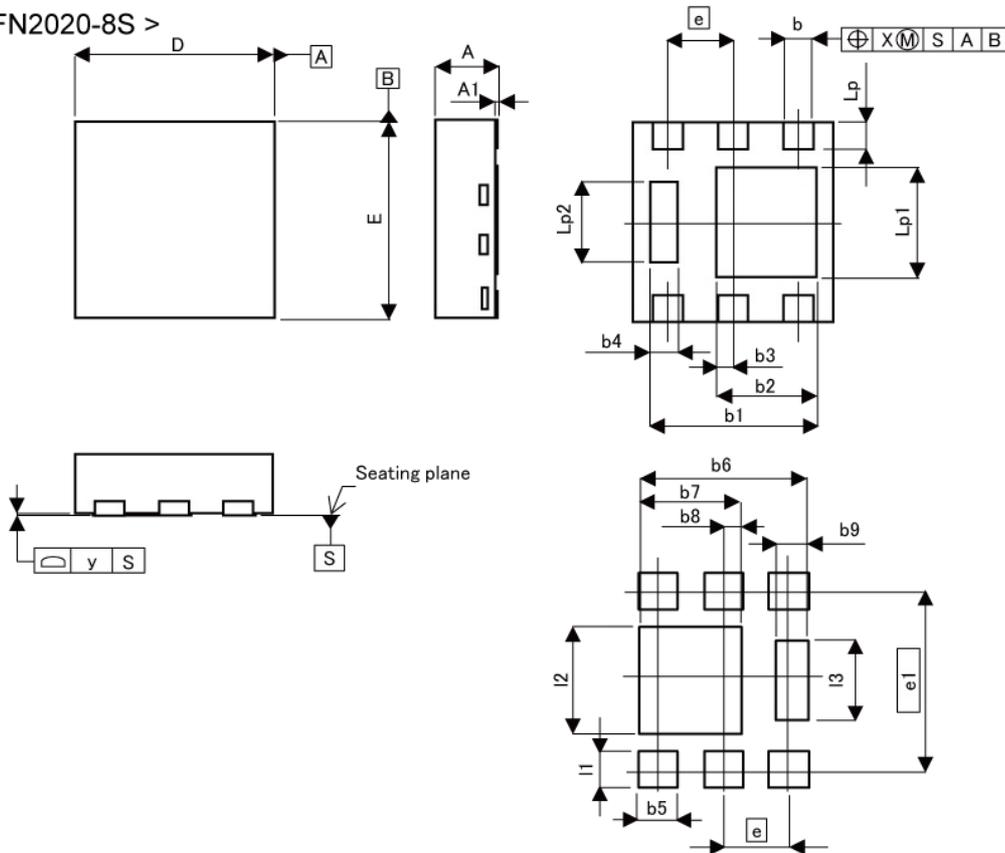
● Notice

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

●Dimensions

HUML2020L8 (Single)

< DFN2020-8S >



Pattern of terminal position areas  
[Not a 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

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