

V_{DSS}	-20V
$R_{DS(on)(Max.)}$	15.6m Ω
I_D	$\pm 10A$
P_D	2W

●Features

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

●Application

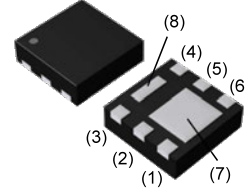
Switching
Load switch

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

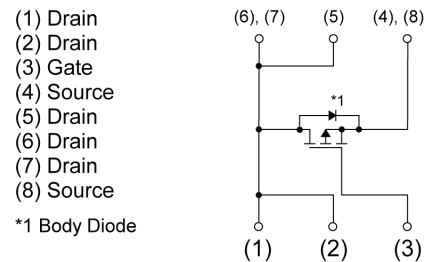
Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	-20	V
Continuous drain current	I_D	± 10	A
Pulsed drain current	$I_{D,pulse}^{*2}$	± 36	A
Gate - Source voltage	V_{GSS}	± 8	V
Avalanche energy, single pulse	E_{AS}^{*3}	15.2	mJ
Avalanche current	I_{AS}^{*3}	-2.0	A
Power dissipation	P_D^{*4}	2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

●Outline

HUML2020L8



●Inner circuit



●Packaging specifications

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

● Thermal resistance

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

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = -1mA$	-20	-	-	V
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	$I_D = -1mA$ referenced to 25°C	-	-10.3	-	mV/°C
Zero gate voltage drain current	I_{DSS}	$V_{DS} = -20V, V_{GS} = 0V$	-	-	-1	μA
Gate - Source leakage current	I_{GSS}	$V_{GS} = \pm 8V, V_{DS} = 0V$	-	-	±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°C	-	1.7	-	mV/°C
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 $V_{gs} \geq 2.5V$ *2 $P_w \leq 10\mu s$, Duty cycle $\leq 1\%$ *3 Tr1: $L \approx 5mH$, $V_{DD} = -10V$, $R_G = 25\Omega$, STARTING $T_j = 25^\circ\text{C}$ 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

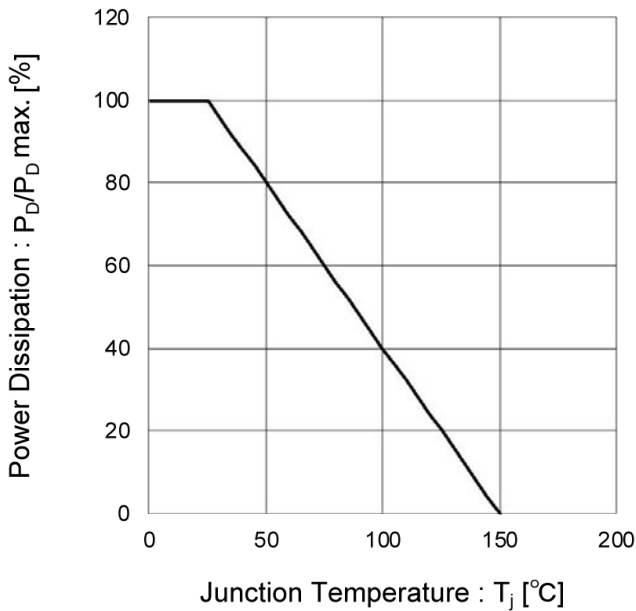


Fig.2 Maximum Safe Operating Area

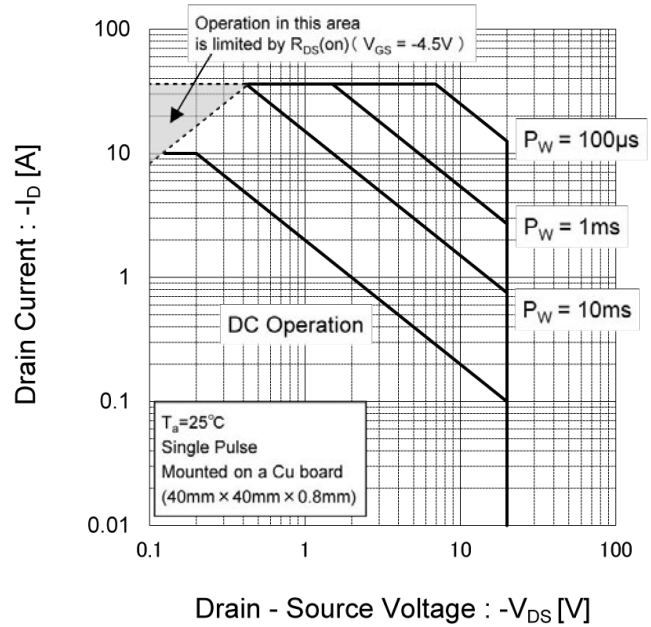


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

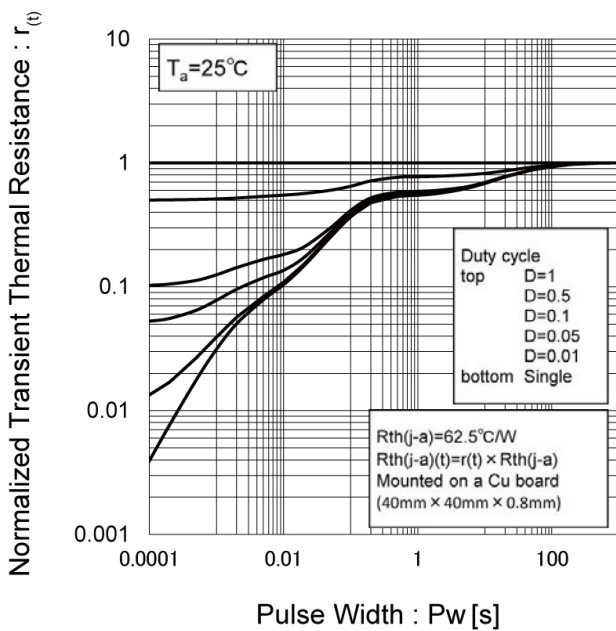
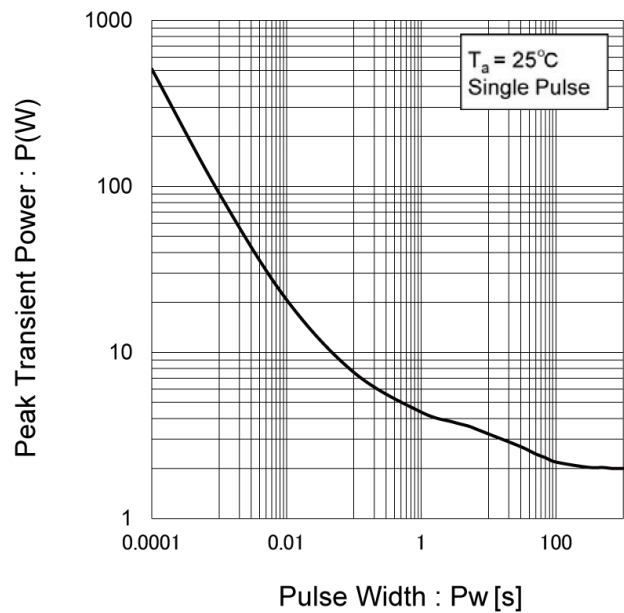


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

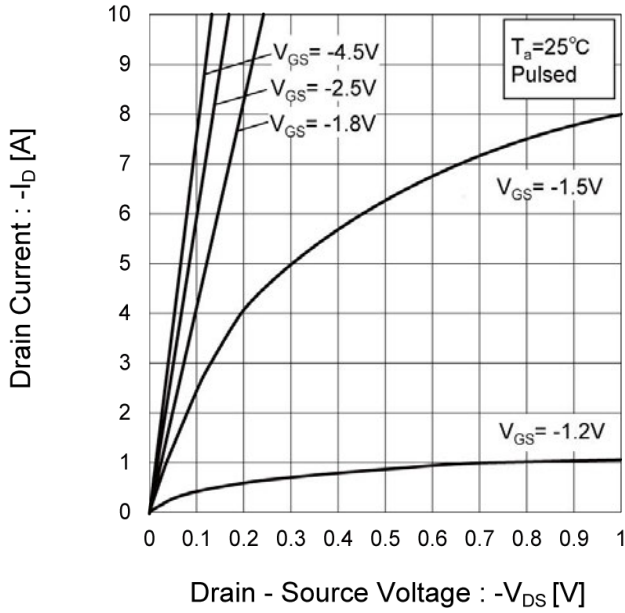


Fig.6 Typical Output Characteristics(II)

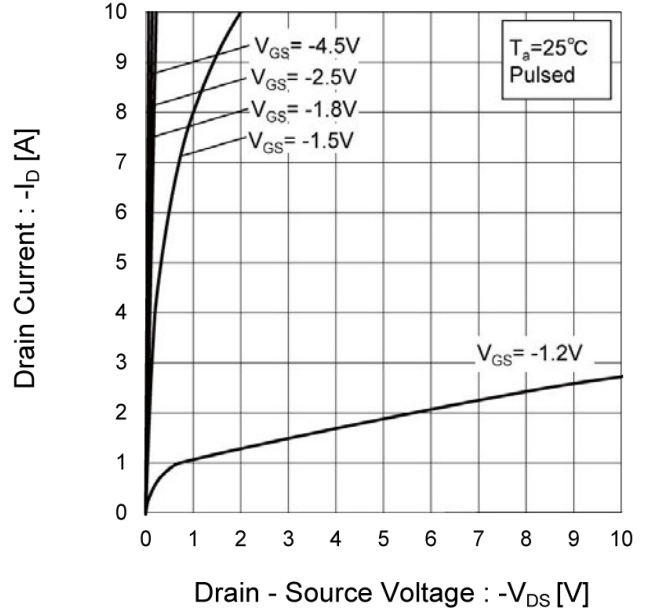
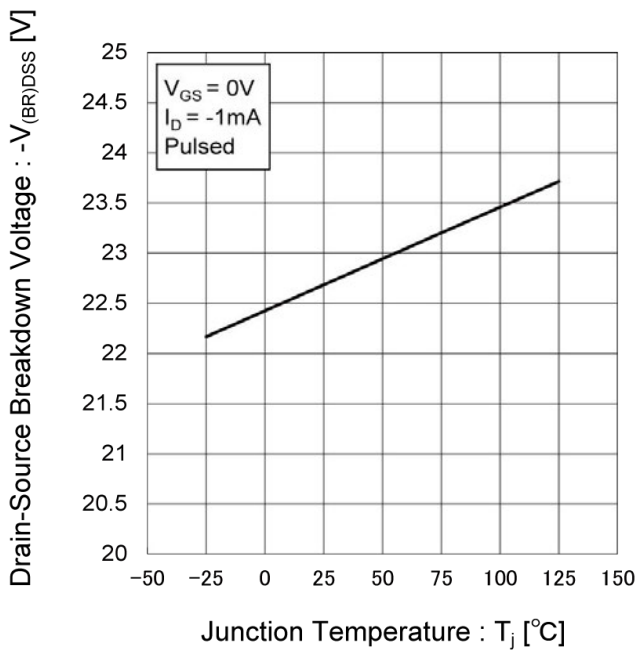


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

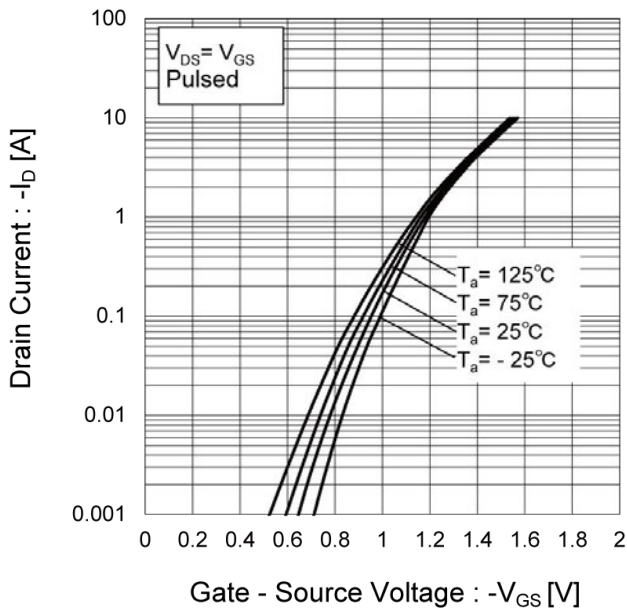


Fig.9 Gate Threshold Voltage vs. Junction Temperature

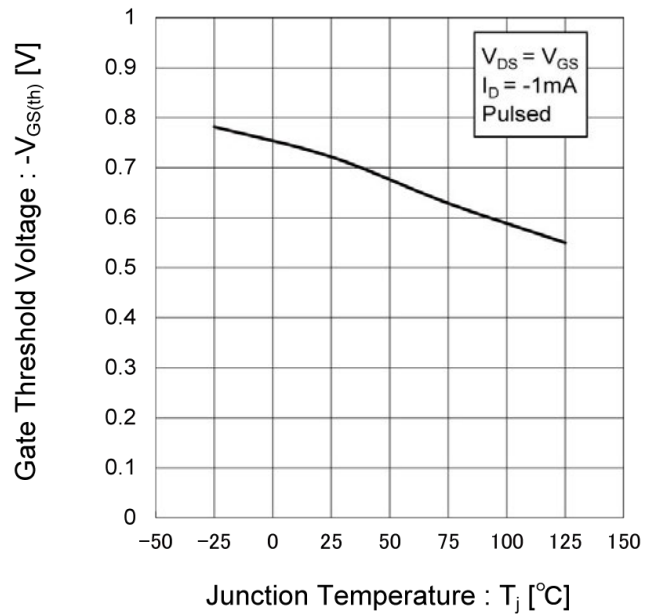
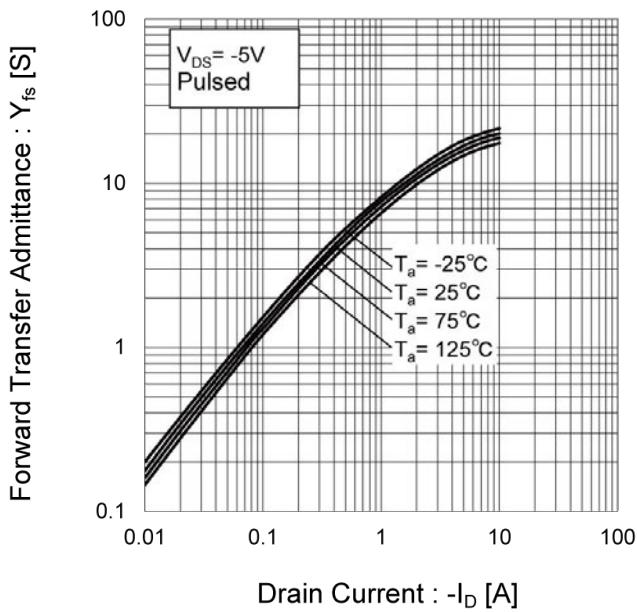


Fig.10 Transconductance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve

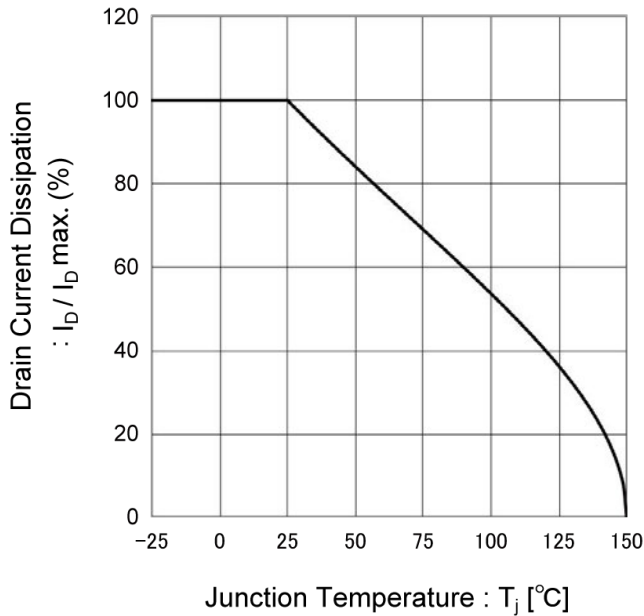


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

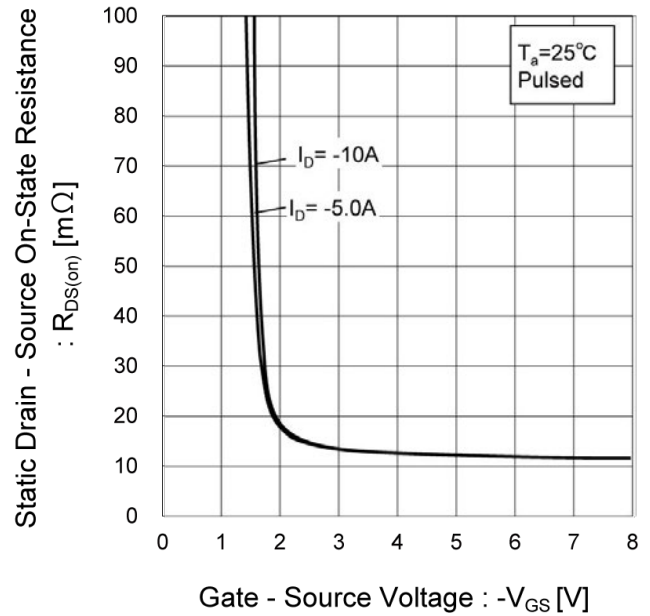
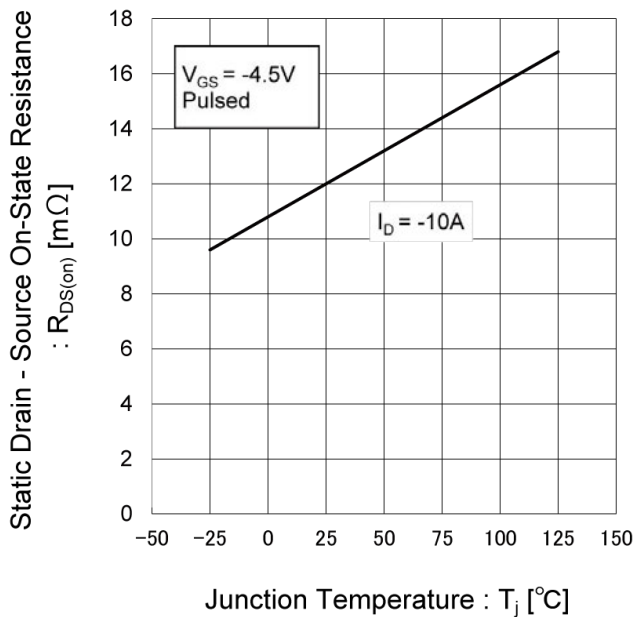


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

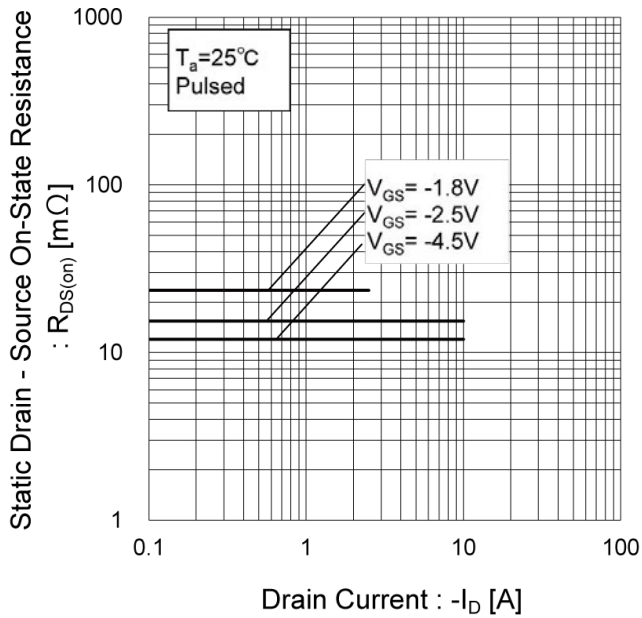


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)

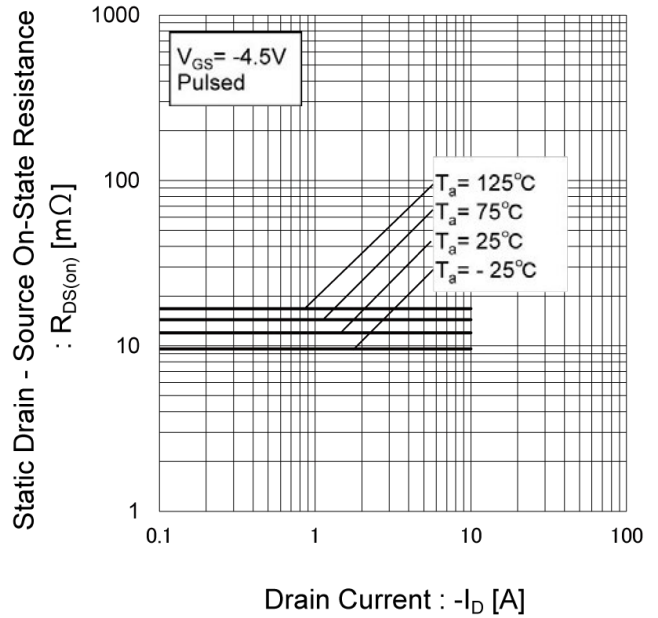


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current(III)

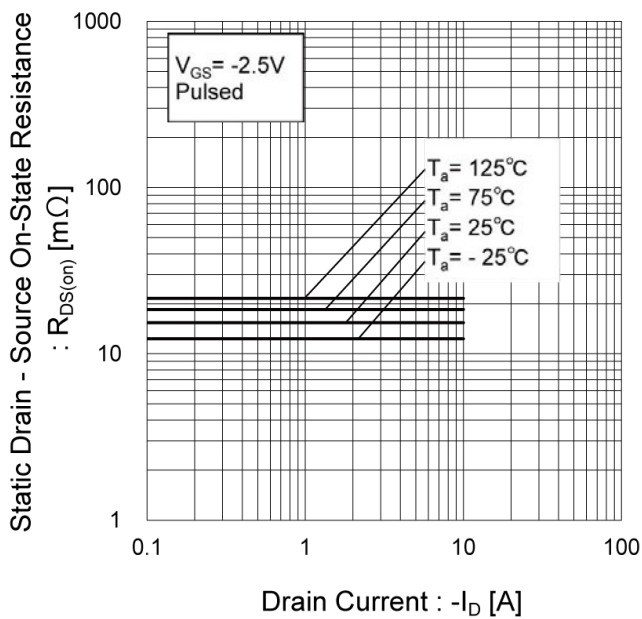
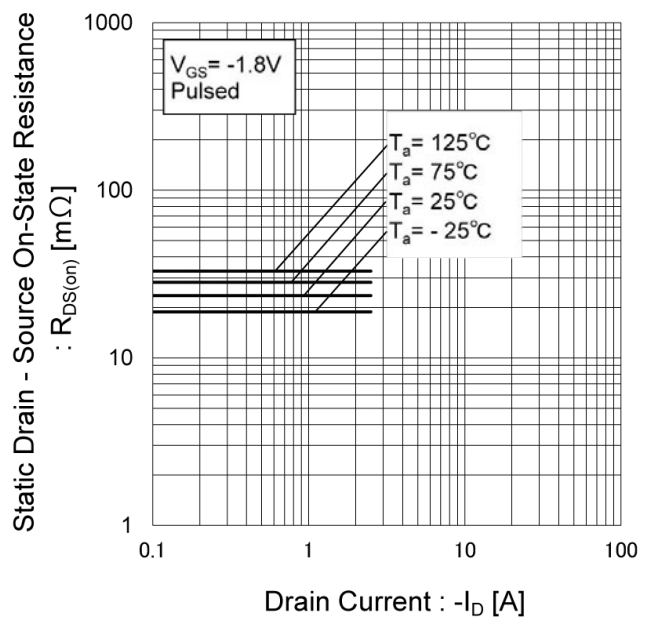


Fig.17 Static Drain - Source On - State Resistance vs. Drain Current(IV)



●Electrical characteristic curves

Fig.18 Typical Capacitance vs. Drain - Source Voltage

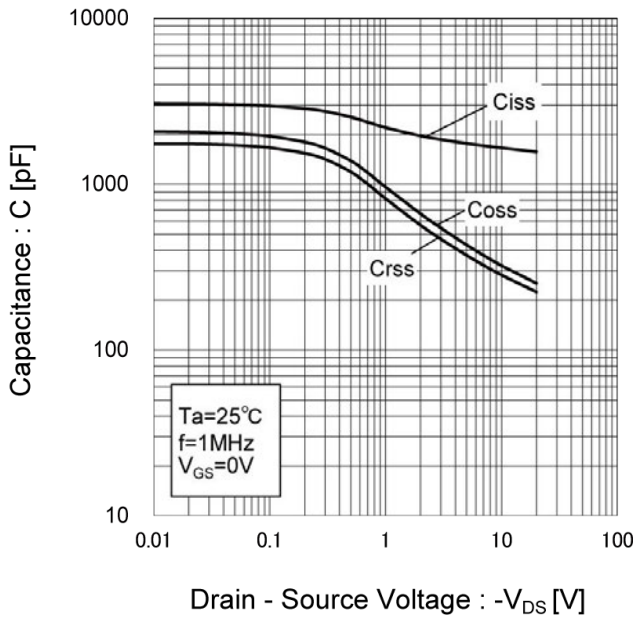


Fig.19 Switching Characteristics

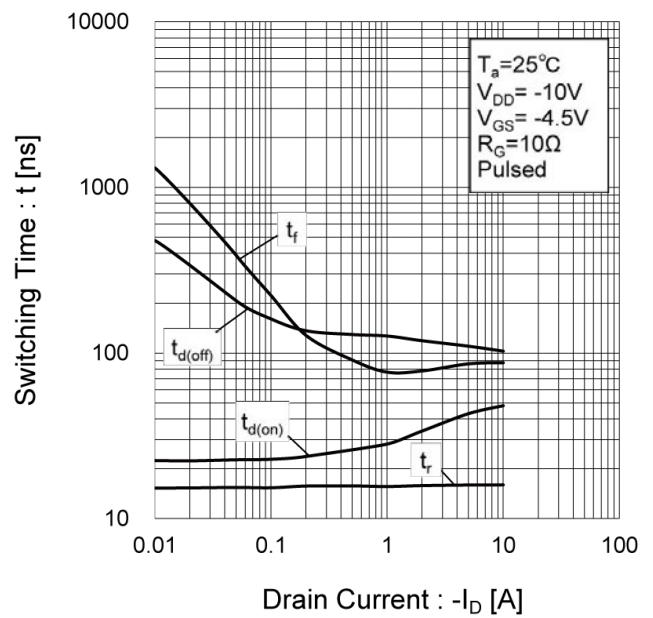


Fig.20 Dynamic Input Characteristics

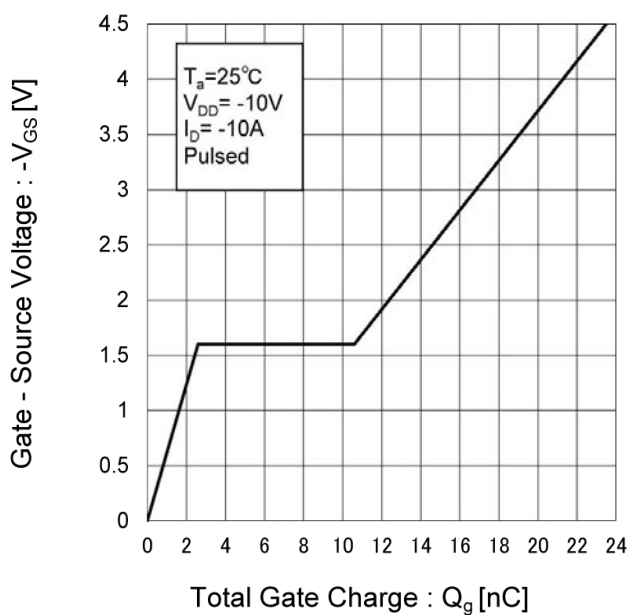
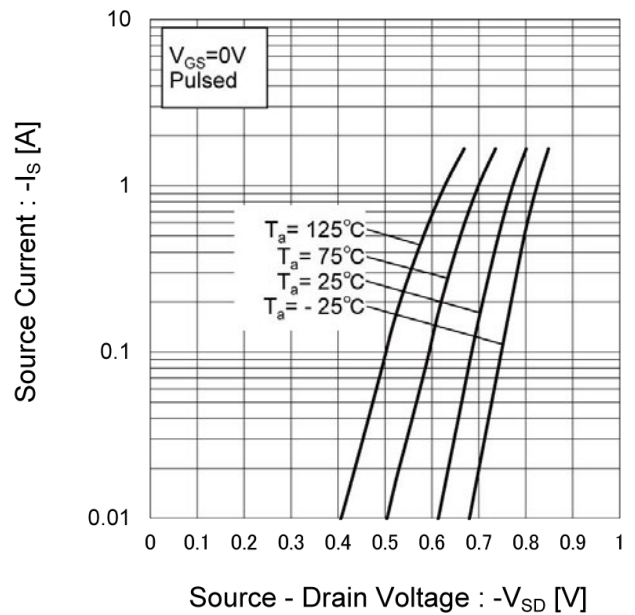


Fig.21 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

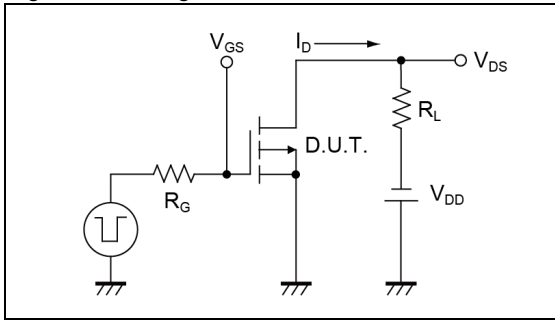


Fig.1-2 Switching Waveforms

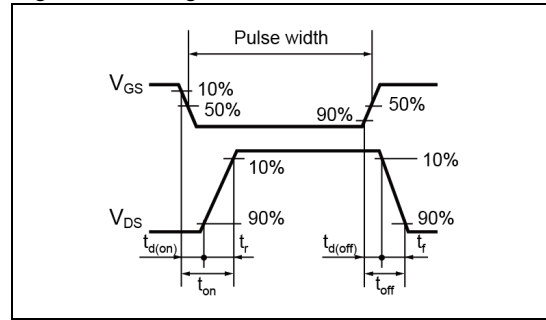


Fig.2-1 Gate Charge Measurement Circuit

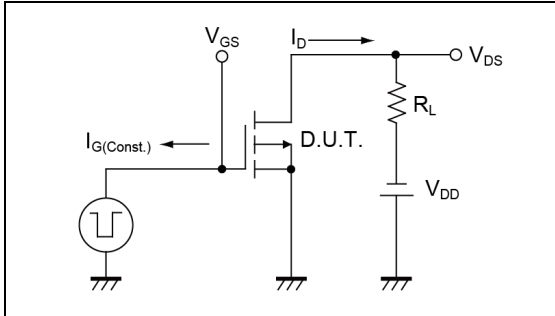


Fig.2-2 Gate Charge Waveform

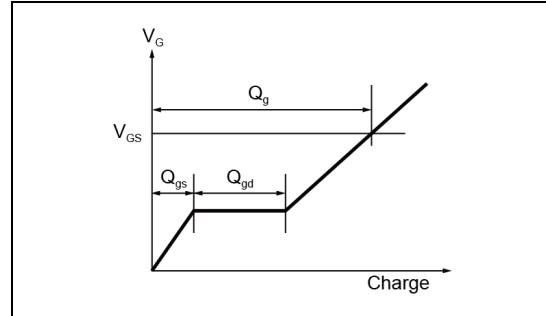


Fig.3-1 Avalanche Measurement Circuit

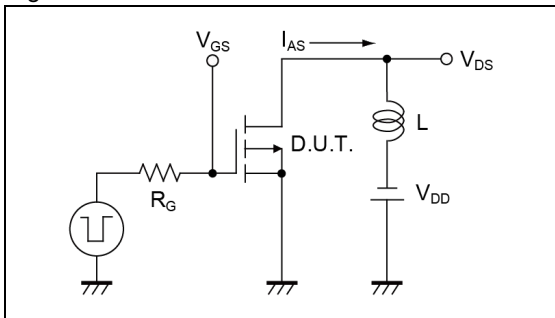
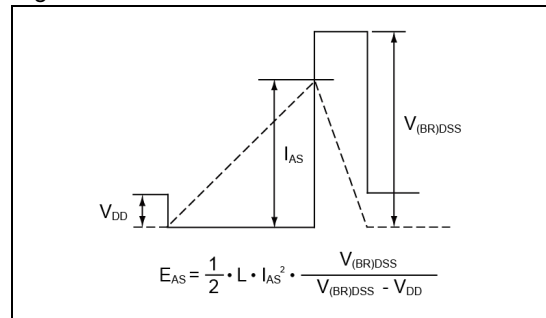


Fig.3-2 Avalanche Waveform

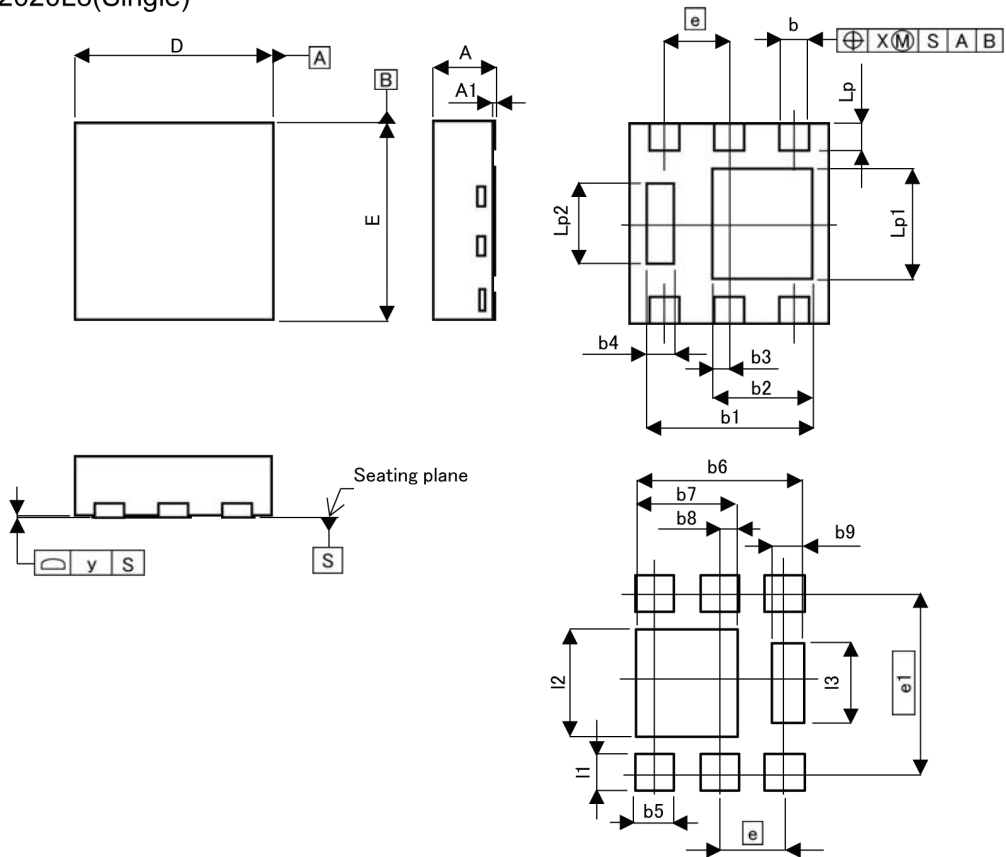


● Notice

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

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