

V_{DSS}	30V
$R_{DS(on)}$ at 10V (Max.)	21.4m Ω
$R_{DS(on)}$ at 4.5V (Max.)	30.0m Ω
I_D	7A
P_D	2.0W

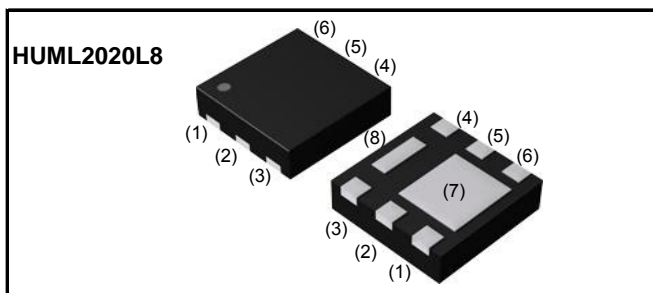
●Features

- 1) Low on - resistance.
- 2) High Power Small Mold Package (HUML2020L8).
- 3) Pb-free lead plating ; RoHS compliant
- 4) Halogen Free
- 5) 100% Rg and UIS Tested

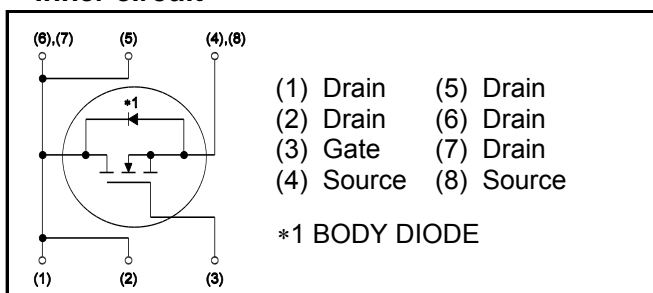
●Application

DC/DC converters
Load Switch

●Outline



●Inner circuit



●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	180
	Tape width (mm)	10
	Basic ordering unit (pcs)	3,000
	Taping code	TR
	Marking	HE

●Absolute maximum ratings($T_a = 25^\circ\text{C}$) ,unless otherwise specified

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	30	V
Continuous drain current	I_D^{*1}	± 7	A
Pulsed drain current	$I_{D,pulse}^{*2}$	± 28	A
Gate - Source voltage	V_{GSS}	± 20	V
Power dissipation	P_D^{*3}	2.0	W
Junction temperature	T_j	150	$^\circ\text{C}$
Range of storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *3	-	-	62.5	°C/W
	R_{thJC}	-	-	-	°C/W

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

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°C	-	26.5	-	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	$V_{GS(th)}$	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	1.0	-	2.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{(GS)th}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	-3	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}$ *4	$V_{GS} = 10V, I_D = 7A$	-	16.4	21.4	m Ω
		$V_{GS} = 4.5V, I_D = 7A$	-	23.0	30.0	
Gate input resistance	R_G	$f = 1MHz, \text{open drain}$	-	4.4	-	Ω
Transconductance	Y_{fs} *4	$V_{DS} = 5V, I_D = 7A$	4	-	-	S

*1 Limited only by maximum temperature allowed.

*2 $P_w \leq 10\mu\text{s}$, Duty cycle $\leq 1\%$

*3 Mounted on a FR4 (40×40×0.8mm)

*4 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	$V_{GS} = 0V$	-	220	-	pF
Output capacitance	C_{oss}	$V_{DS} = 15V$	-	75	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	23	-	
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} \approx 15V, V_{GS} = 10V$	-	5.8	-	ns
Rise time	t_r^{*4}	$I_D = 3.5A$	-	4.0	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L = 4.3\Omega$	-	16.5	-	
Fall time	t_f^{*4}	$R_G = 10\Omega$	-	2.8	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*4}	$V_{DD} \approx 15V, I_D=7A$ $V_{GS} = 10V$	-	4.8	-	nC
		$V_{DD} \approx 15V, I_D=7A$ $V_{GS} = 4.5V$	-	2.2	-	
Gate - Source charge	Q_{gs}^{*4}	$V_{GS} = 4.5V$	-	1.3	-	
Gate - Drain charge	Q_{gd}^{*4}		-	0.4	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S^{*1}	$T_a = 25^\circ\text{C}$	-	-	1.67	A
Forward voltage	V_{SD}^{*4}	$V_{GS} = 0V, I_S = 1.67A$	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

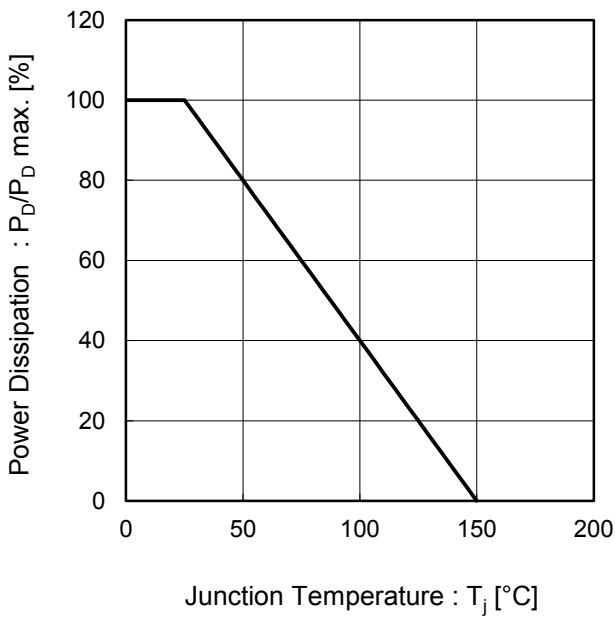


Fig.2 Maximum Safe Operating Area

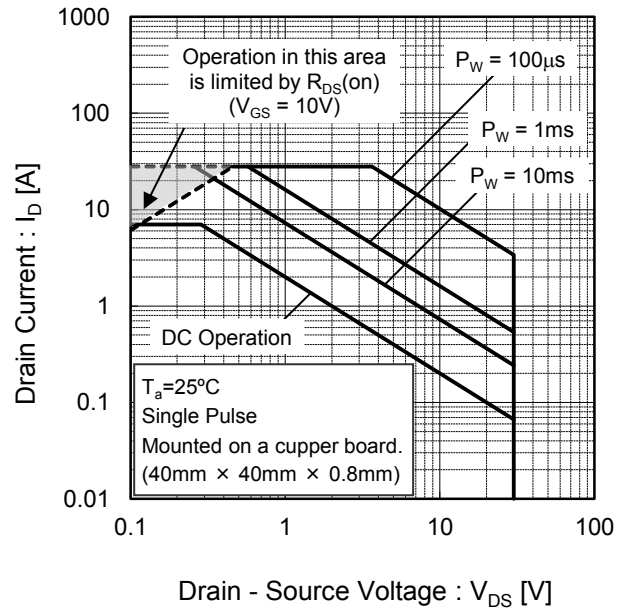


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

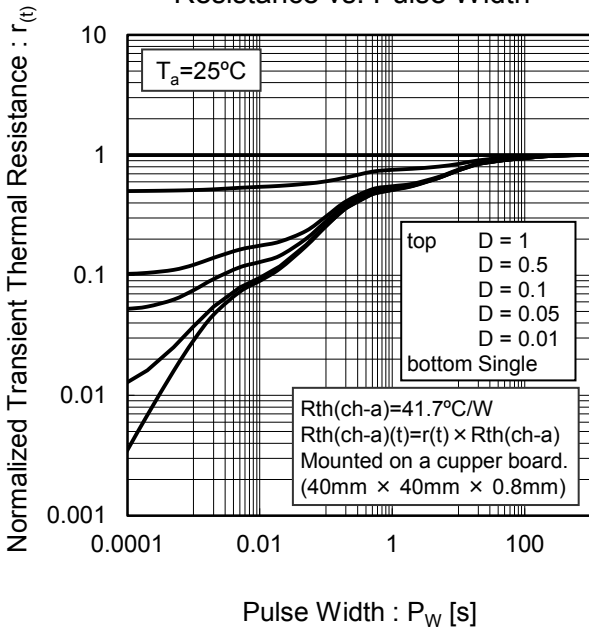
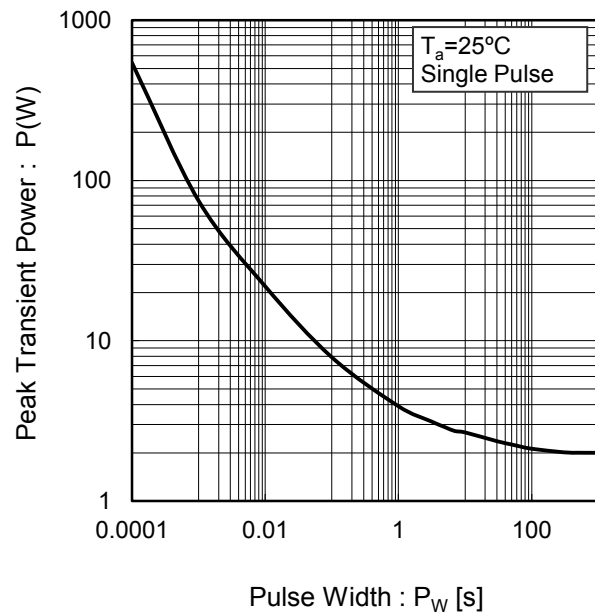


Fig.4 Single Pulse Maximum Power dissipation



●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

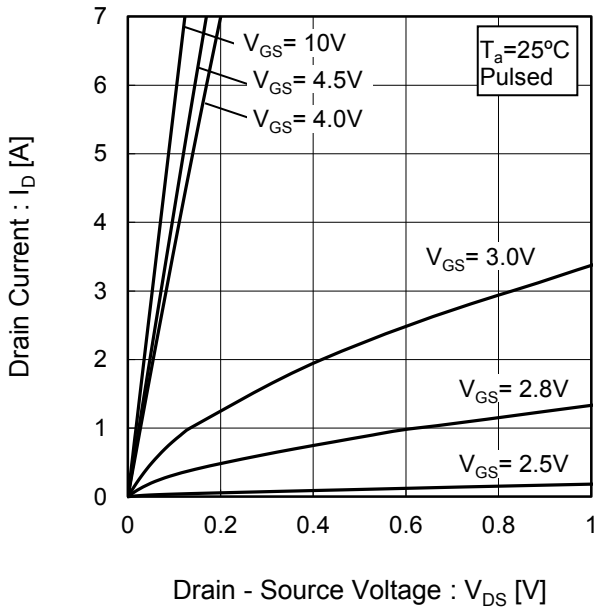


Fig.6 Typical Output Characteristics(II)

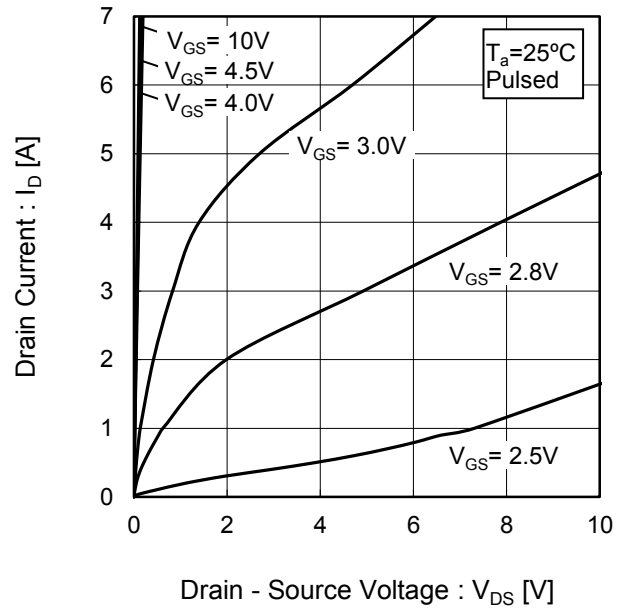


Fig.7 Breakdown Voltage vs. Junction Temperature

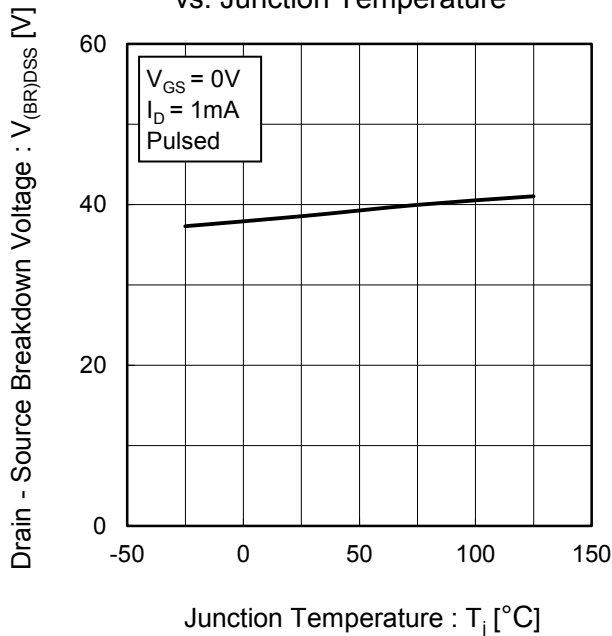
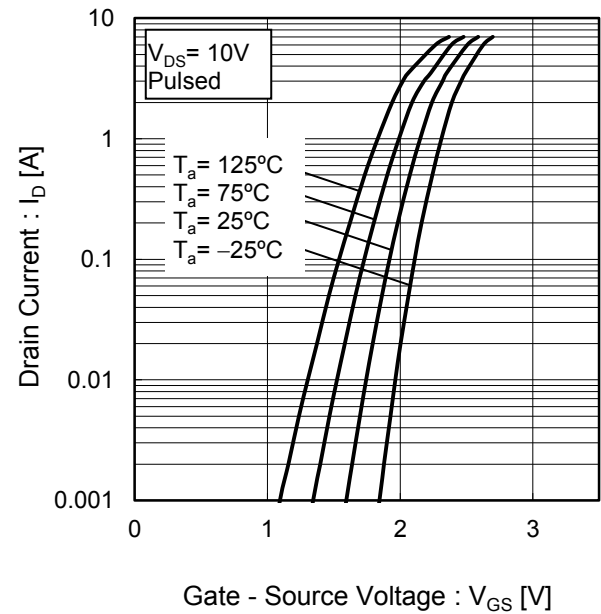


Fig.8 Typical Transfer Characteristics



●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

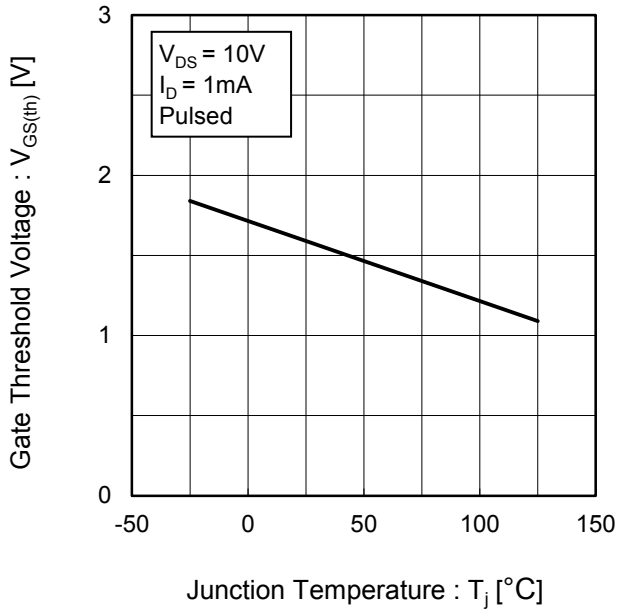


Fig.10 Transconductance vs. Drain Current

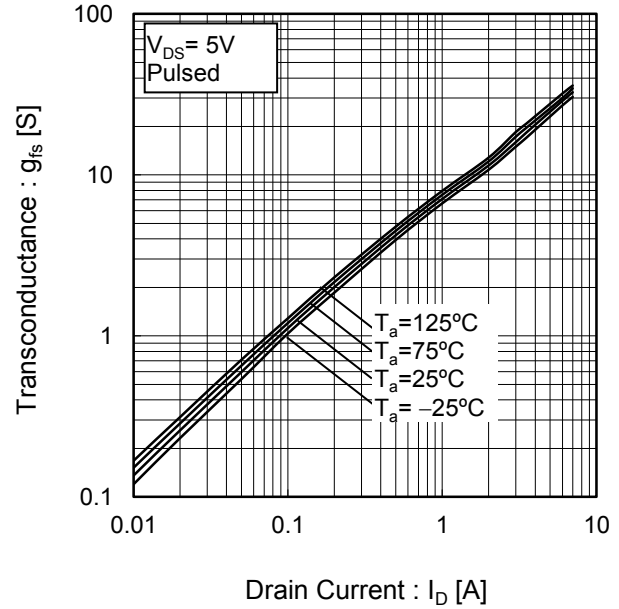


Fig.11 Drain Current Derating Curve

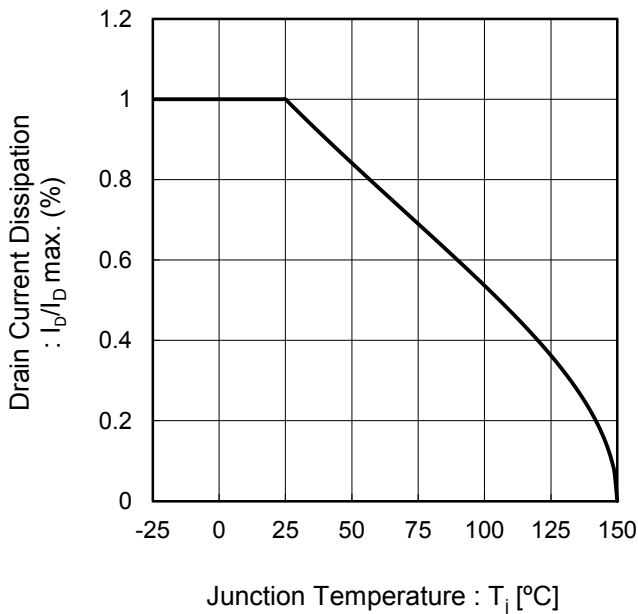
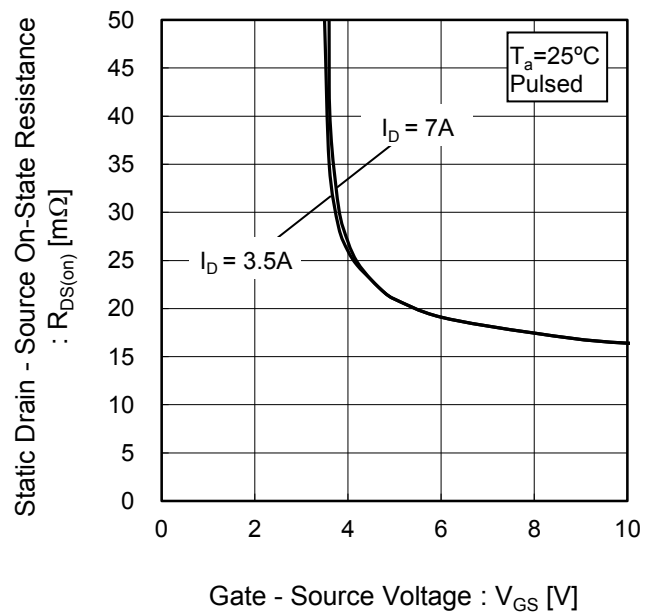


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



●Electrical characteristic curves

Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(I)

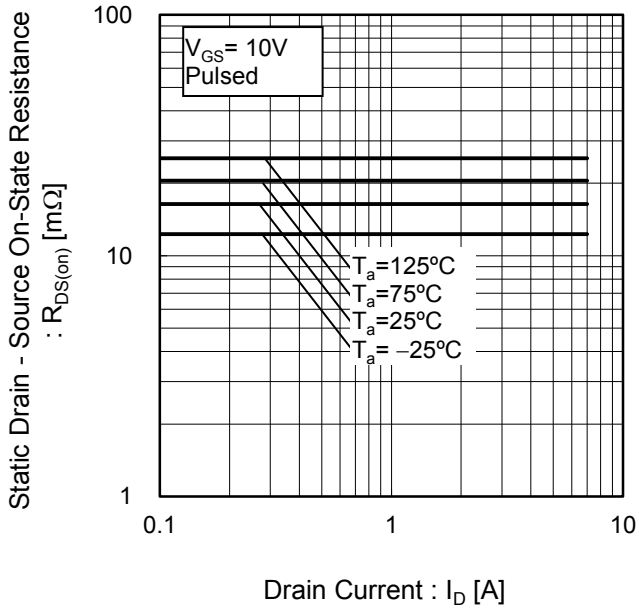


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature

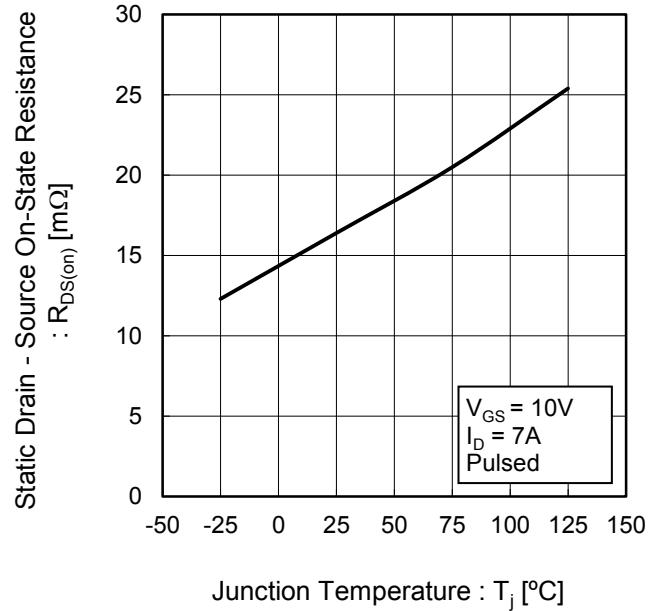
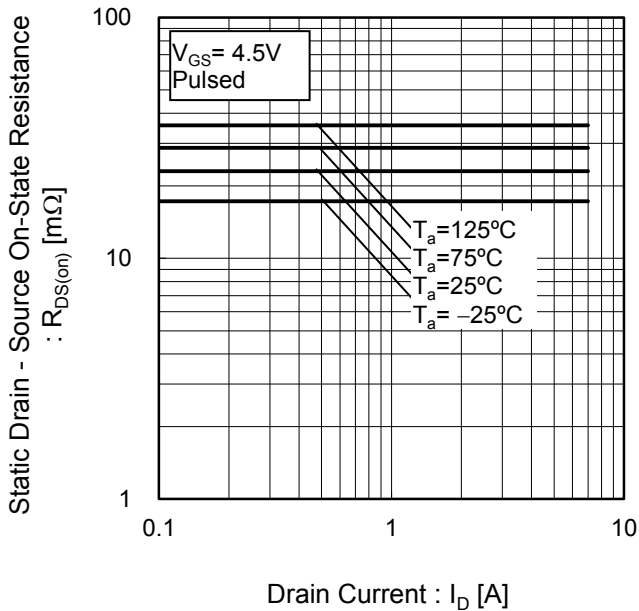


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

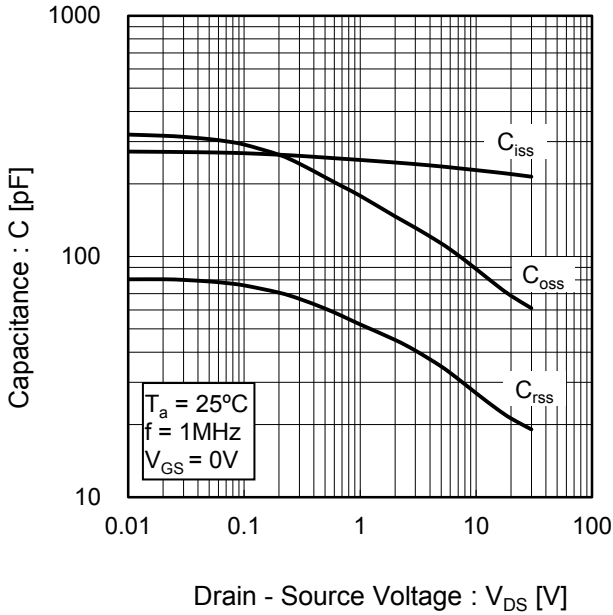


Fig.17 Switching Characteristics

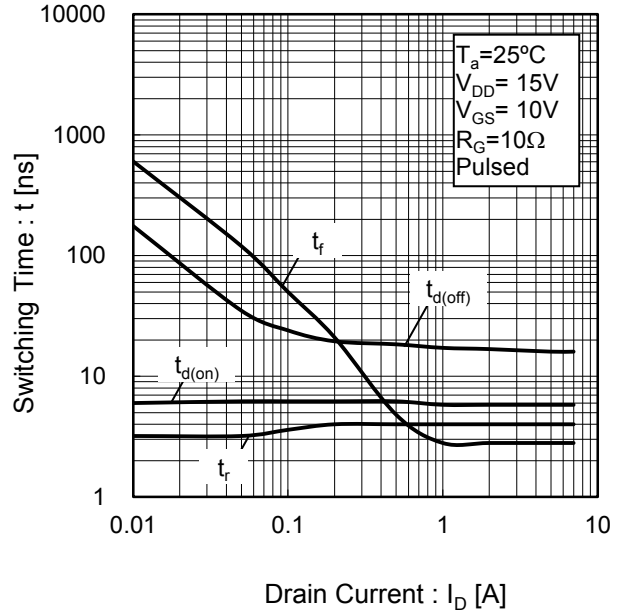


Fig.18 Dynamic Input Characteristics

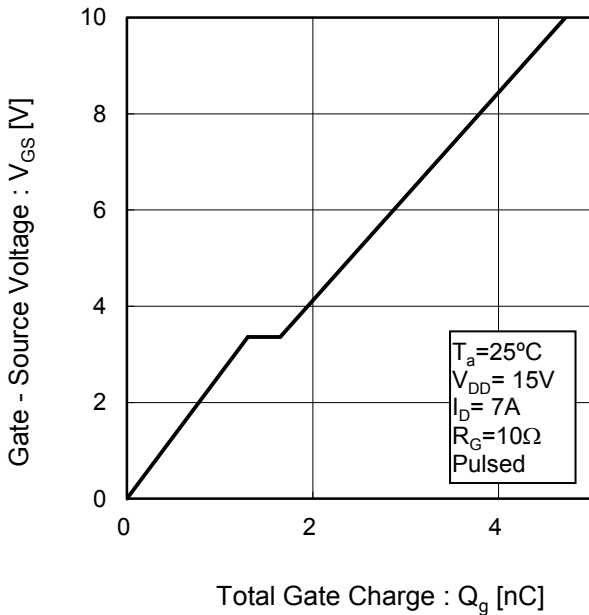
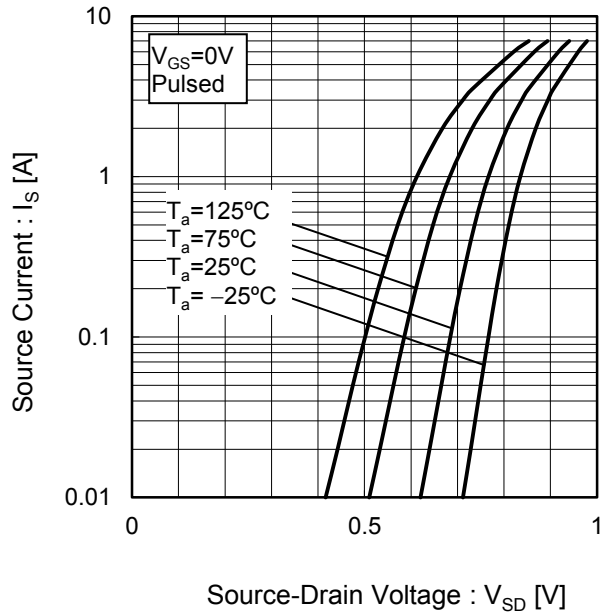


Fig.19 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

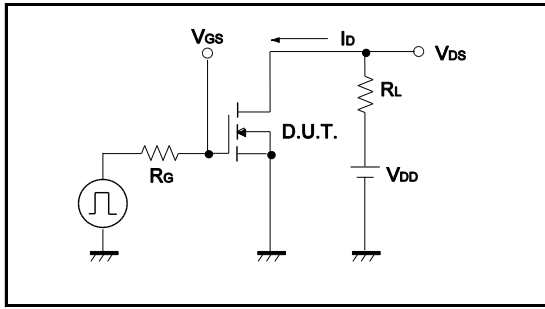


Fig.1-2 Switching Waveforms

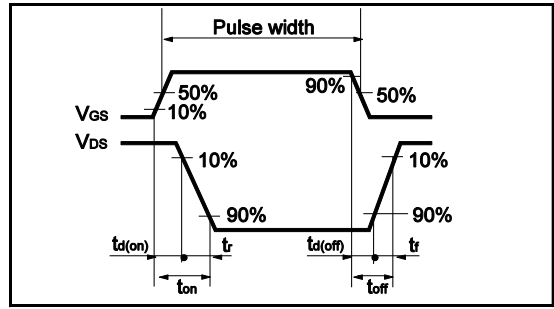


Fig.2-1 Gate Charge Measurement Circuit

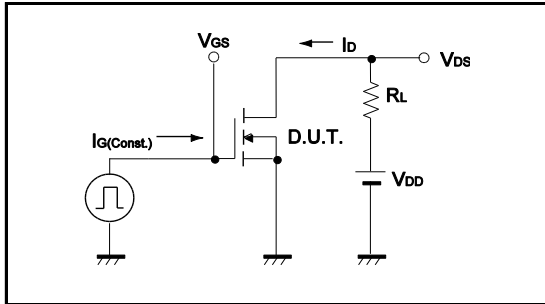
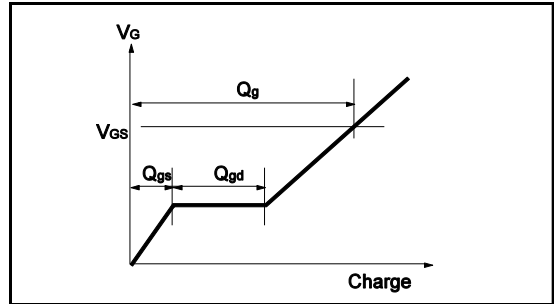
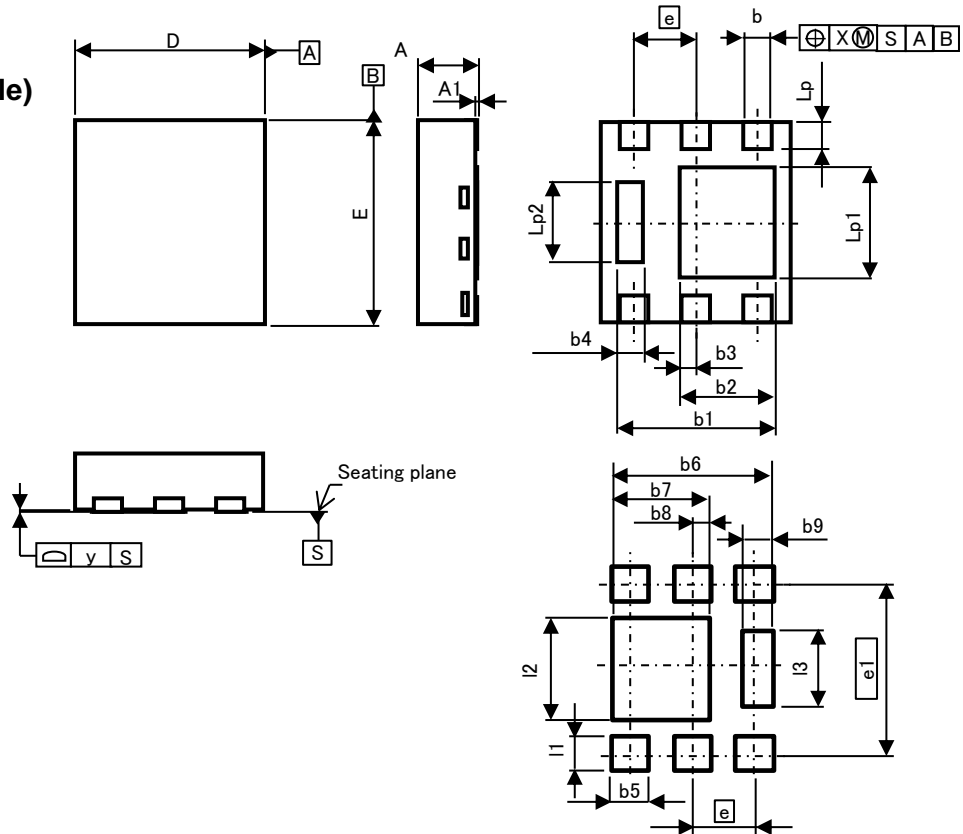


Fig.2-2 Gate Charge Waveform



●Dimensions (Unit : mm)

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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