RF4E070BN

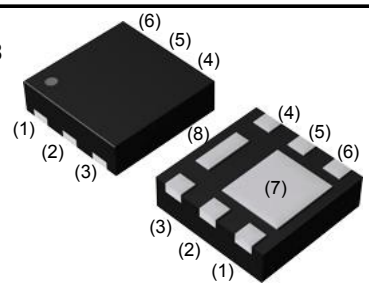
Nch 30V 7A Power MOSFET

Datasheet

V_{DSS}	30V
$R_{DS(on)}$ at 10V (Max.)	28.6mΩ
$R_{DS(on)}$ at 4.5V (Max.)	40.0mΩ
I_D	±7A
P_D	2.0W

●Outline

HUML2020L8



●Features

1) Low on - resistance.

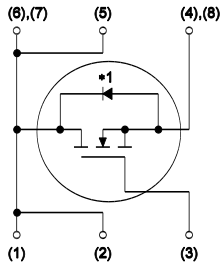
2) High Power Small Mold Package (HUML2020L8).

3) Pb-free lead plating ; RoHS compliant

4) Halogen Free

5) 100% Rg and UIS Tested

●Inner circuit



(1) Drain (5) Drain
(2) Drain (6) Drain
(3) Gate (7) Drain
(4) Source (8) Source

∗1 BODY DIODE

●Application

DC/DC converters

Load switch

●Packaging specifications

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

●Absolute maximum ratings(T_a = 25°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	°C
Range of storage temperature	T_{stg}	−55 to +150	°C

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●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°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	-	18	-	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} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS\ (th)}$	V_{GS} = V_{DS}, I_D = 250μA	1.0	-	2.0	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{(GS)th}}{\Delta T_j}$	I_D=1mA referenced to 25°C	-	−2.1	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS}=10V, I_D=7A	-	22.0	28.6	mΩ
		V_{GS}=4.5V, I_D=7A	-	30.8	40.0	
Gate input resistannce	R_G	f = 1MHz, open drain	-	3.2	-	Ω
Transconductance	g_{fs} *4	V_{DS}=5V, I_D=7A	4.0	-	-	S

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 Mounted on a FR4 (40×40×0.8mm)

*4 Pulsed

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●**Electrical characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	410	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	50	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	40	-	
Turn - on delay time	$t_{d(on)}$ *4	$V_{DD} \simeq$ 15V, V_{GS} = 10V	-	6	-	ns
Rise time	t_r *4	I_D = 3.5A	-	8	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 4.29Ω	-	23	-	
Fall time	t_f *4	R_G = 10Ω	-	5	-	

●**Gate Charge characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *4	$V_{DD} \simeq$ 15V, I_D=7A V_{GS} = 10V	-	8.9	-	nC
		$V_{DD} \simeq$ 15V, I_D=7A V_{GS} = 4.5V	-	4.6	-	
Gate - Source charge	Q_{gs} *4		-	1.9	-	
Gate - Drain charge	Q_{gd} *4		-	1.4	-	

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

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

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

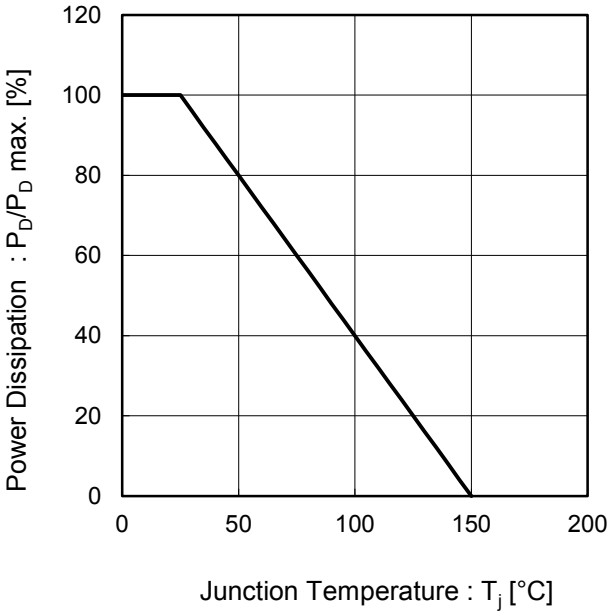


Fig.2 Maximum Safe Operating Area

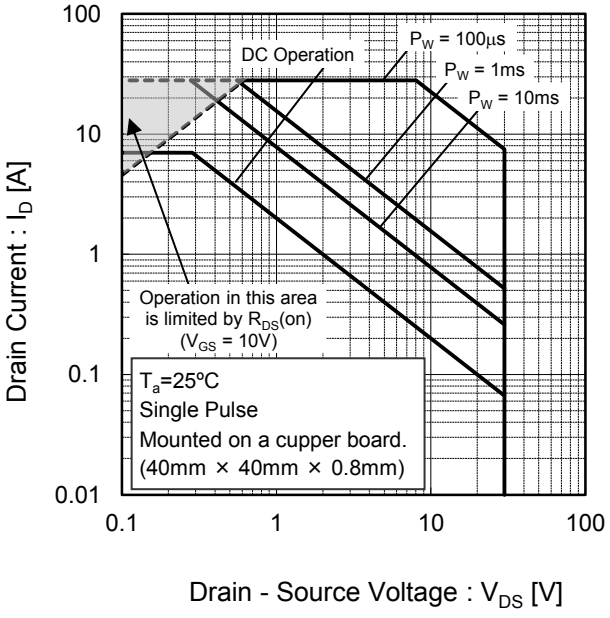


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

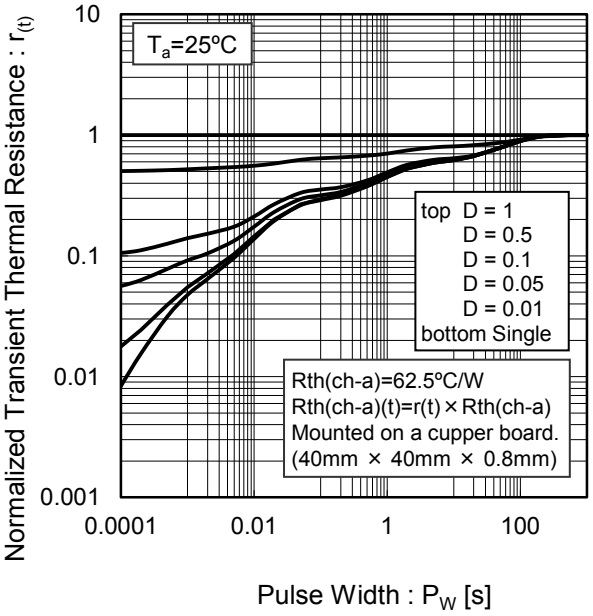
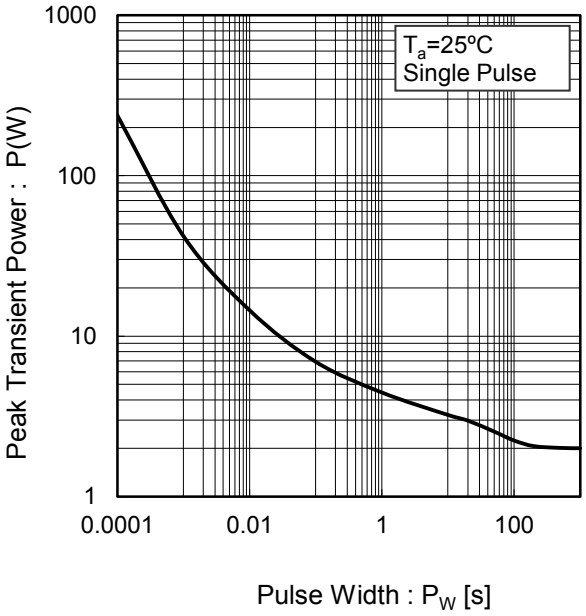


Fig.4 Single Pulse Maximum Power dissipation



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●Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

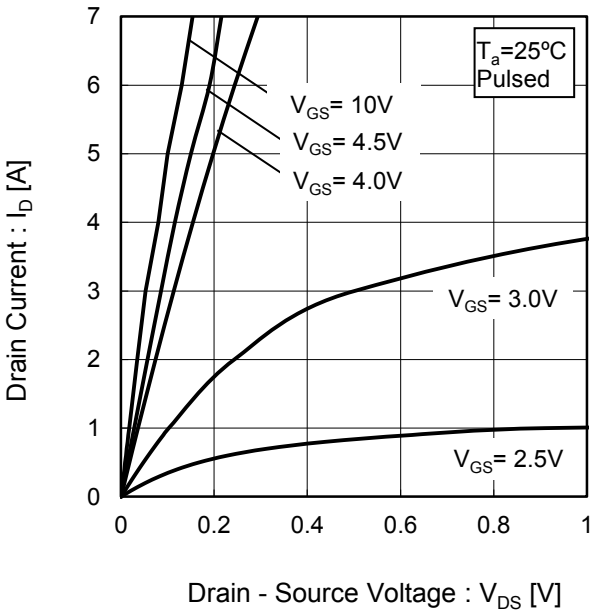


Fig.6 Typical Output Characteristics(II)

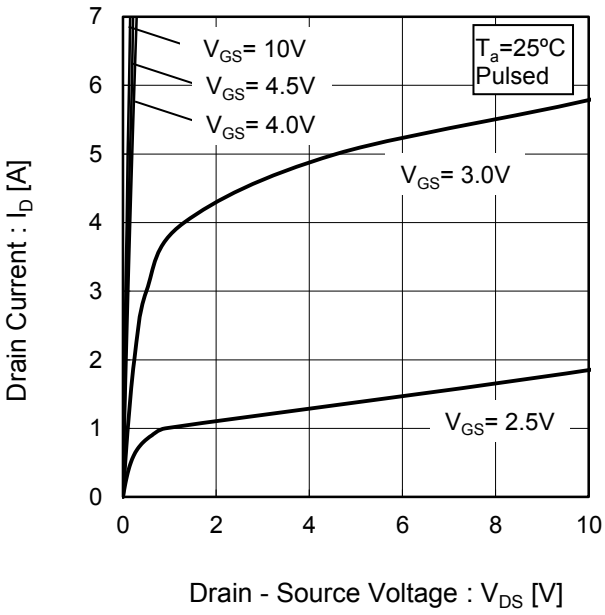


Fig.7 Breakdown Voltage vs. Junction Temperature

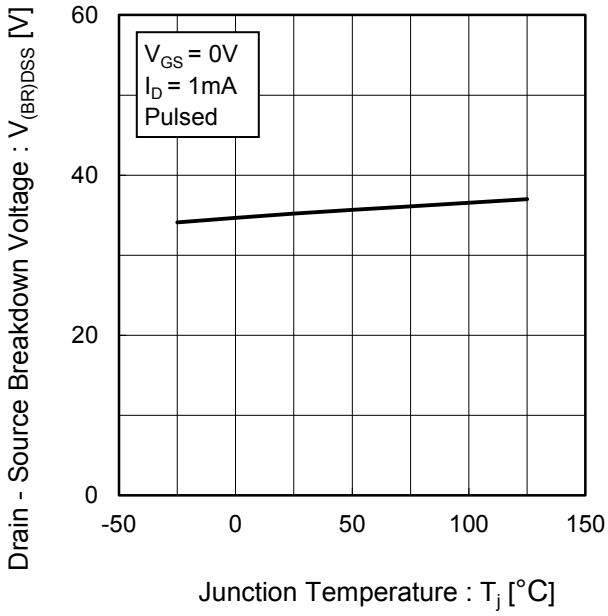
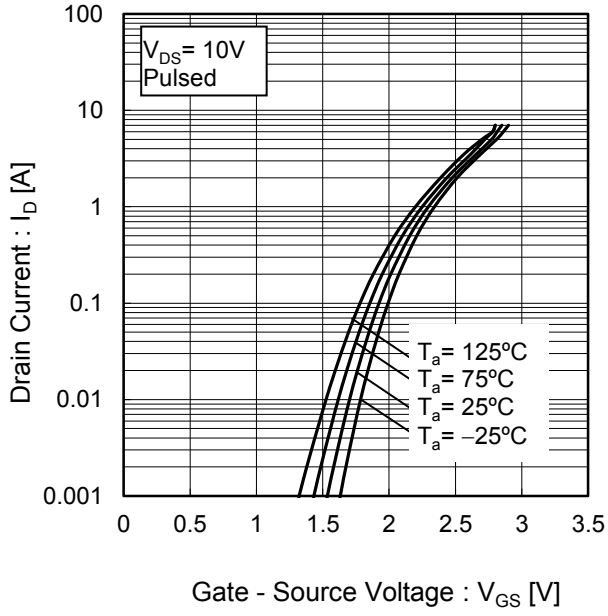


Fig.8 Typical Transfer Characteristics



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●Electrical characteristic curves

Fig.9 Gate Threshold Voltage vs. Junction Temperature

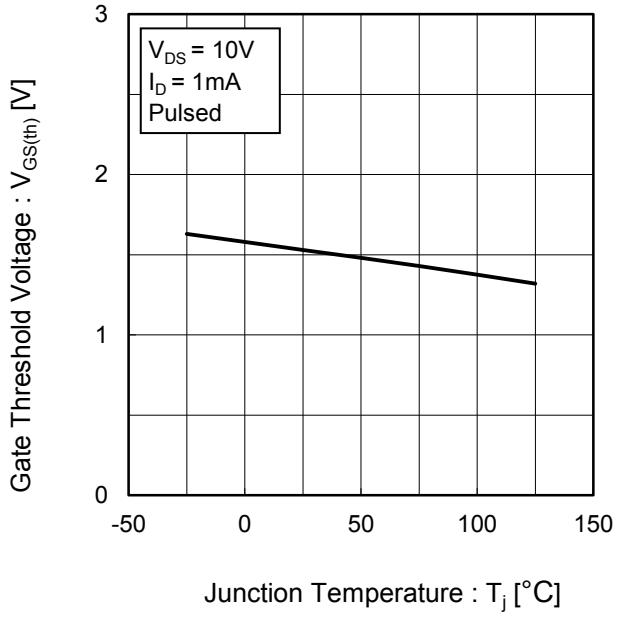


Fig.10 Transconductance vs. Drain Current

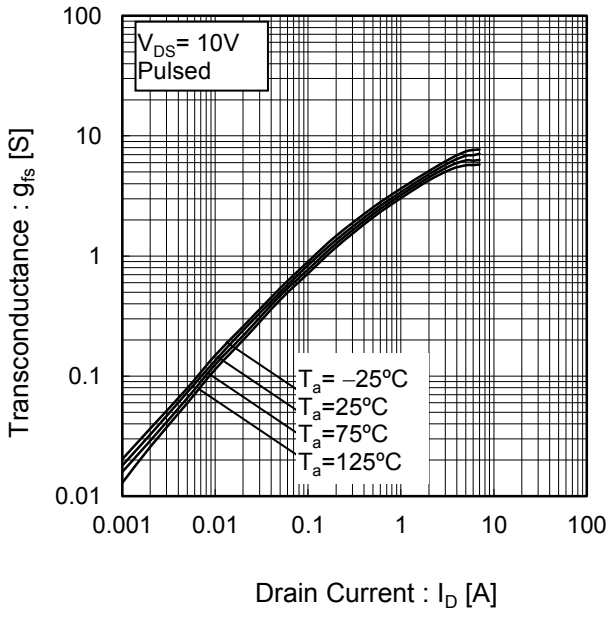


Fig.11 Drain Current Derating Curve

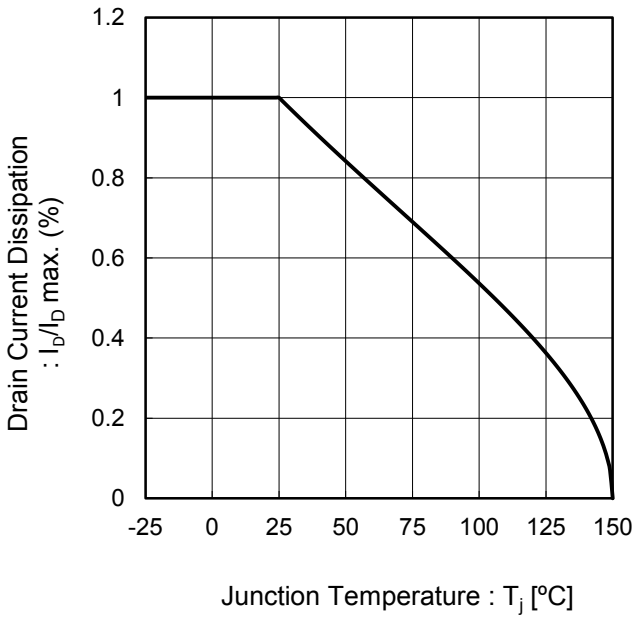
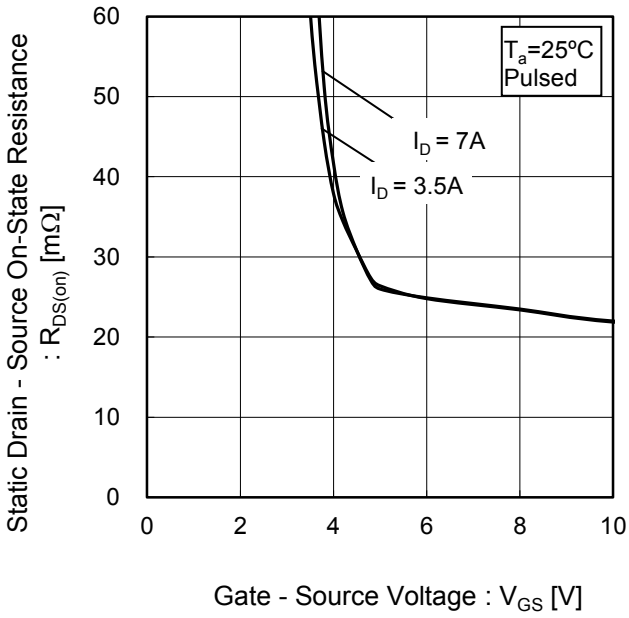


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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●Electrical characteristic curves

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

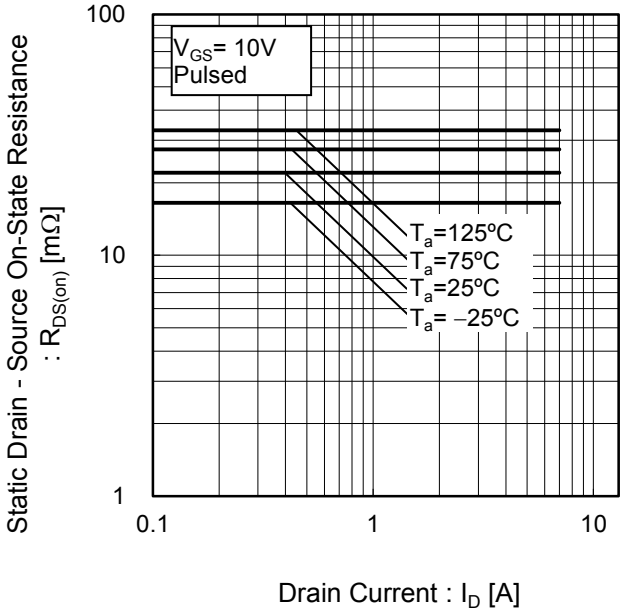


Fig.14 Static Drain - Source On - State Resistance vs. Junction Temperature

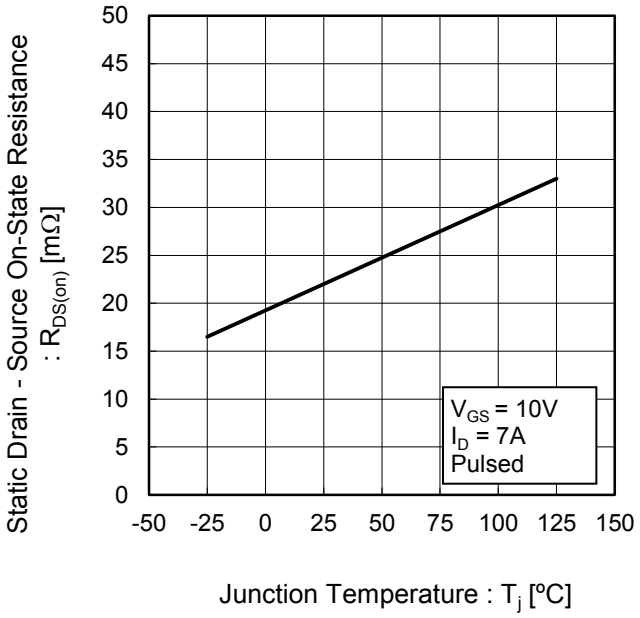
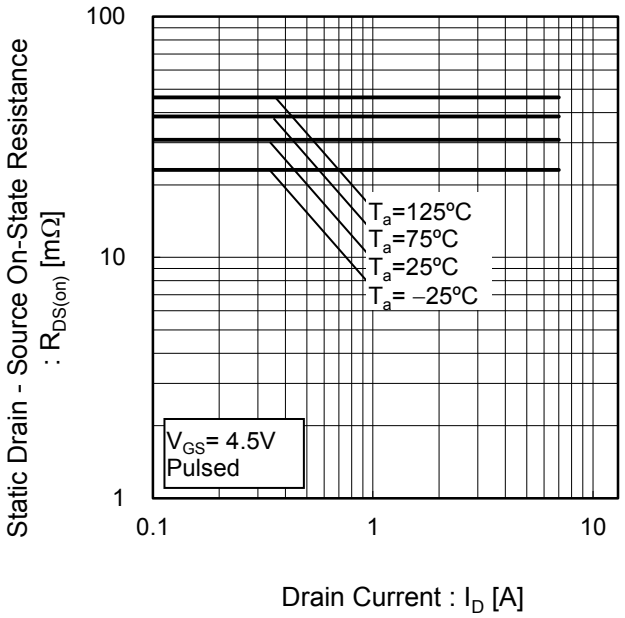


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(II)



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●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

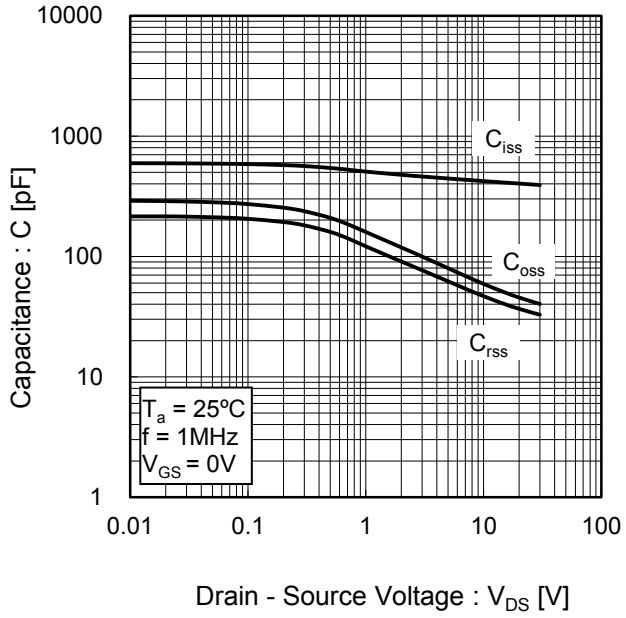


Fig.17 Switching Characteristics

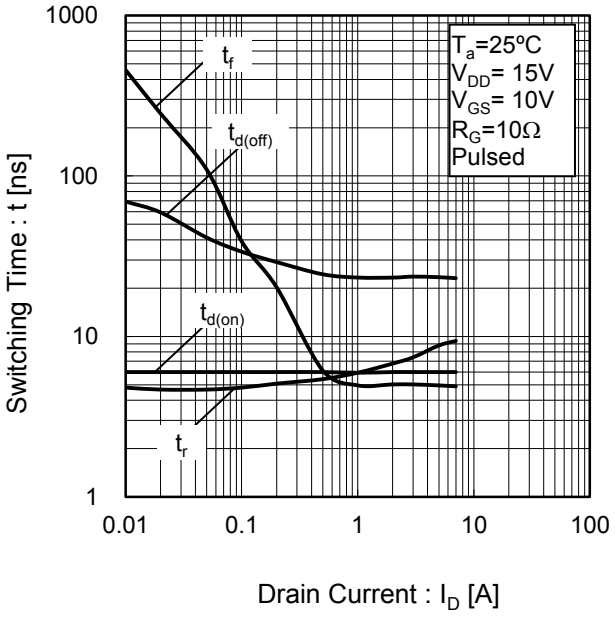


Fig.18 Dynamic Input Characteristics

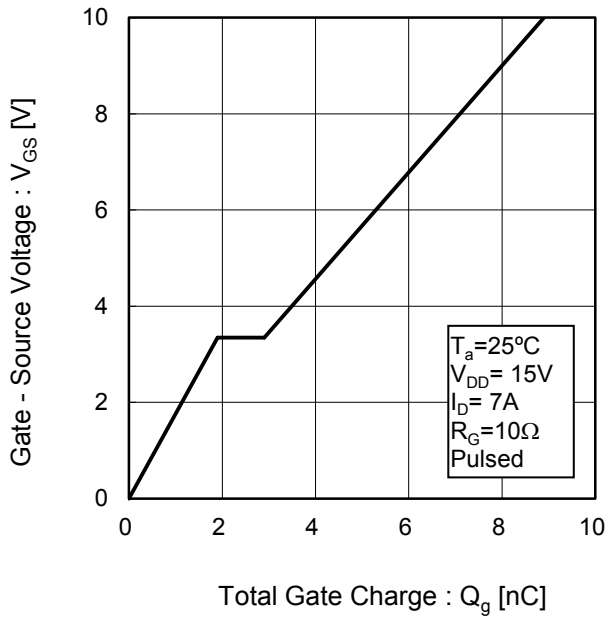
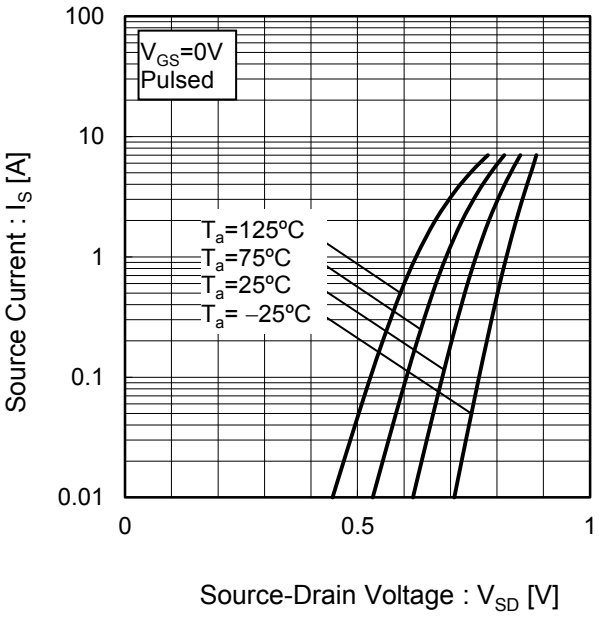


Fig.19 Source Current vs. Source Drain Voltage



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●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

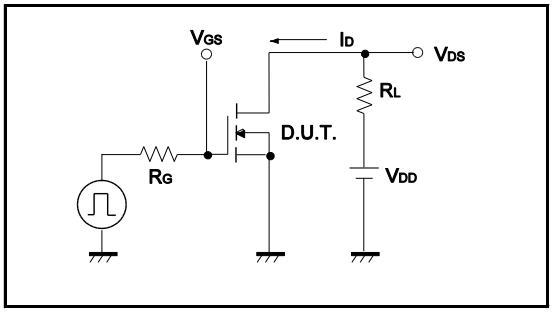


Fig.1-2 Switching Waveforms

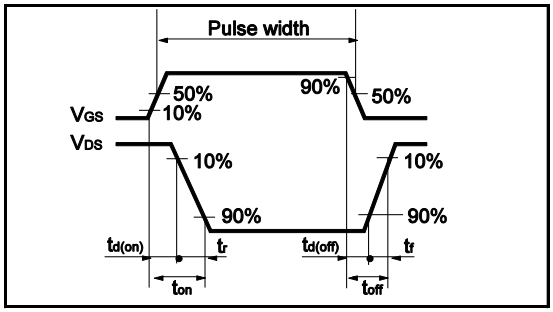


Fig.2-1 Gate Charge Measurement Circuit

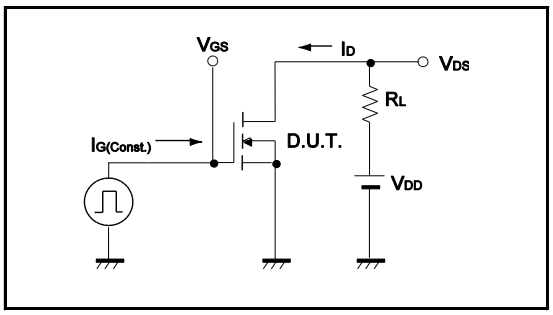
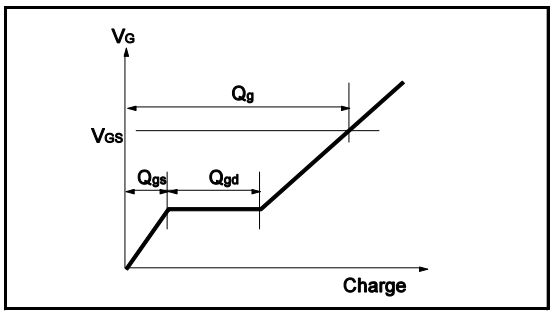


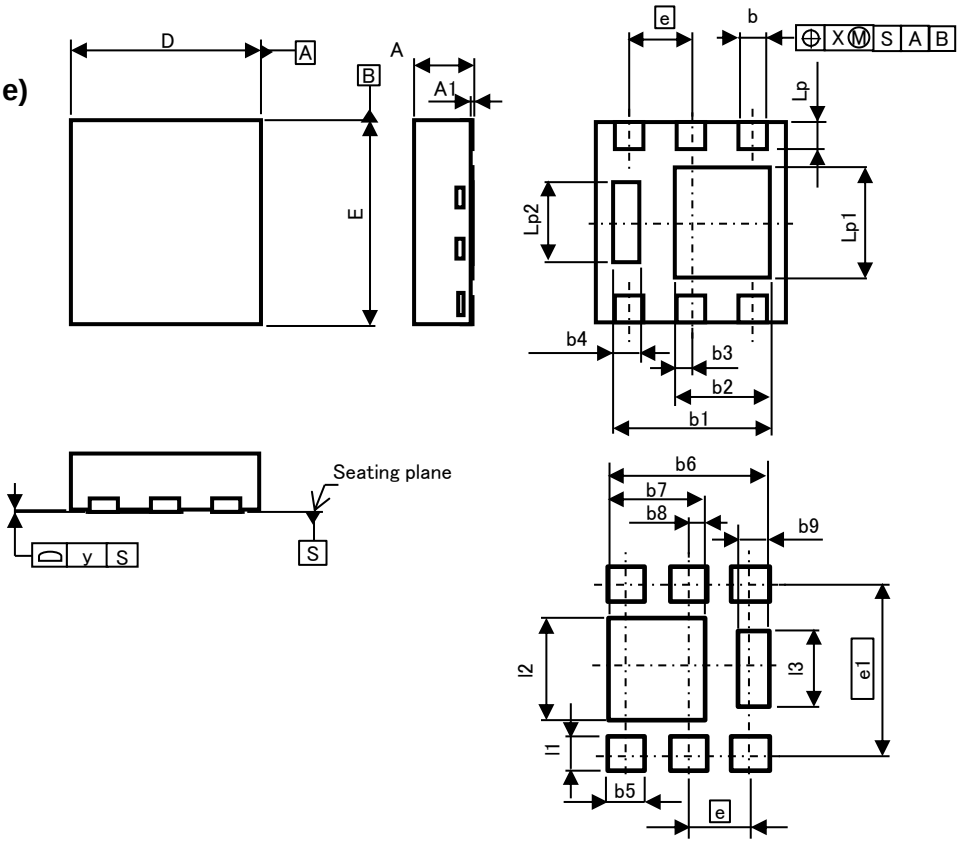
Fig.2-2 Gate Charge Waveform



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●**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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