

RF4E100AJ

Nch 30V 10A Middle Power MOSFET

V_{DSS}	30V
$R_{DS(on)(Max.)}$	12.4m Ω
I_D	$\pm 10A$
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.

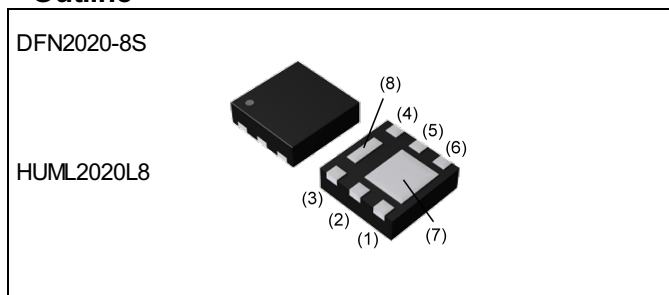
●Application

Switching
DC/DC converter
Battery switch

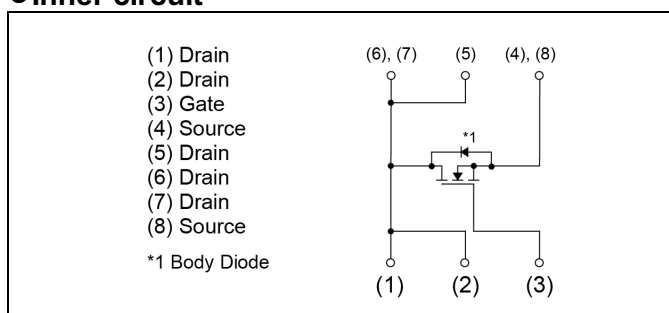
●Absolute maximum ratings ($T_a = 25^{\circ}C$,unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	30	V
Continuous drain current	I_D	± 10	A
Pulsed drain current	I_{DP}^{*1}	± 36	A
Gate - Source voltage	V_{GSS}	± 12	V
Avalanche current, single pulse	I_{AS}^{*2}	2.7	A
Avalanche energy, single pulse	E_{AS}^{*2}	6.7	mJ
Power dissipation	P_D^{*3}	2.0	W
Junction temperature	T_j	150	$^{\circ}C$
Operating junction and storage temperature range	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	TCR
	Marking	HV

● Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}^{*3}	-	-	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°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}	$V_{GS} = \pm 12V, V_{DS} = 0V$	-	-	± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 1mA$	0.5	-	1.5	V
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	$I_D = 1mA$ referenced to 25°C	-	-1.8	-	mV/°C
Static drain - source on - state resistance	$R_{DS(on)}^{*4}$	$V_{GS} = 4.5V, I_D = 10A$	-	9.4	12.4	m Ω
		$V_{GS} = 2.5V, I_D = 5.0A$	-	13.3	17.9	
Gate resistance	R_G	f=1MHz, open drain	-	1.1	-	Ω
Forward Transfer Admittance	$ Y_{fs} ^{*4}$	$V_{DS} = 5V, I_D = 3A$	6.0	-	-	S

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

*2 $L \approx 1\text{mH}$, $V_{DD} = 15V$, $R_G = 25\Omega$, STARTING $T_j = 25^\circ\text{C}$ Fig.3-1,3-2

*3 Mounted on a Cu Board (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}	$V_{GS} = 0V$	-	1460	-	pF
Output capacitance	C_{oss}	$V_{DS} = 15V$	-	170	-	
Reverse transfer capacitance	C_{rss}	$f = 1\text{MHz}$	-	115	-	
Turn - on delay time	$t_{d(on)}^{*4}$	$V_{DD} \approx 15V, V_{GS} = 4.5V$	-	21	-	ns
Rise time	t_r^{*4}	$I_D = 5A$	-	21	-	
Turn - off delay time	$t_{d(off)}^{*4}$	$R_L \approx 3\Omega$	-	54	-	
Fall time	t_f^{*4}	$R_G = 10\Omega$	-	20	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g^{*4}	$V_{DD} \approx 15V,$	-	13.0	-	nC
Gate - Source charge	Q_{gs}^{*4}	$I_D = 10A,$	-	3.3	-	
Gate - Drain charge	Q_{gd}^{*4}	$V_{GS} = 4.5V$	-	3.2	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S	$T_a = 25^\circ\text{C}$	-	-	1.67	A
Pulse forward current	I_{SP}^{*1}		-	-	36	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

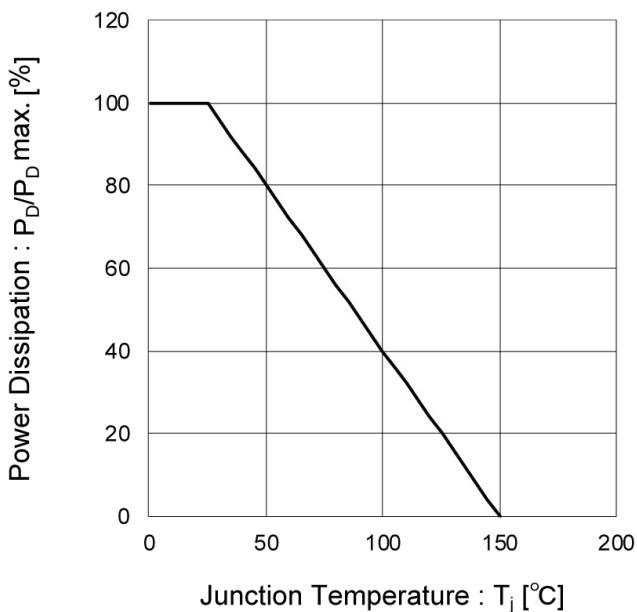


Fig.2 Maximum Safe Operating Area

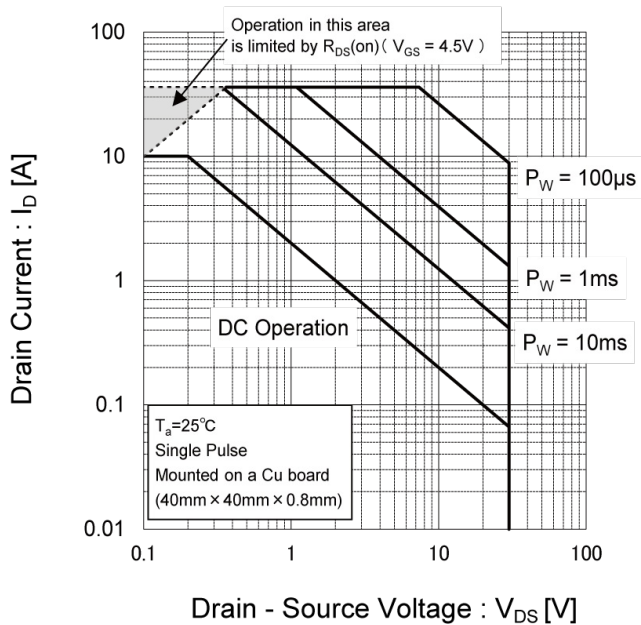


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width

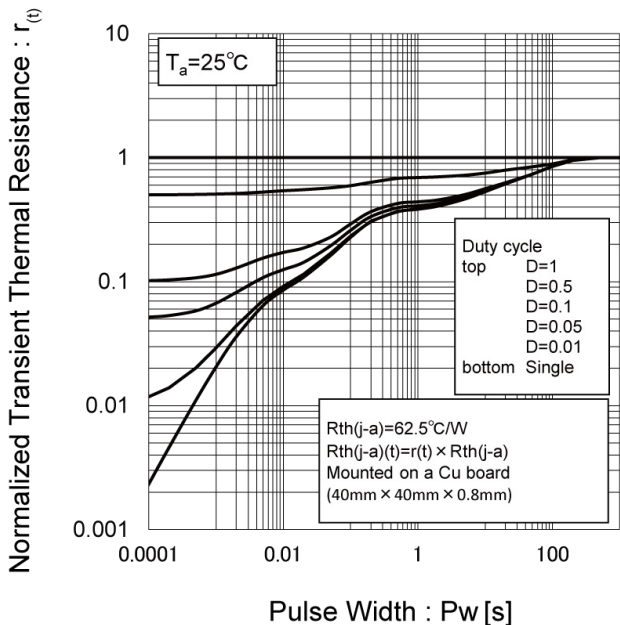
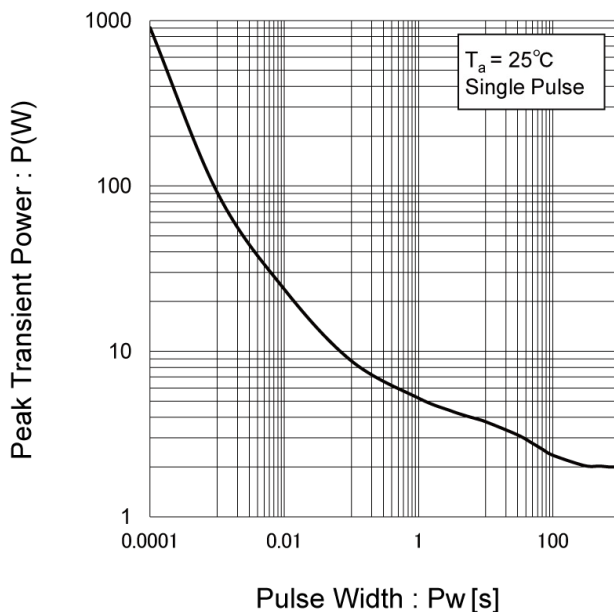


Fig.4 Single Pulse Maximum Power dissipation



● Electrical characteristic curves

Fig.5 Typical Output Characteristics(I)

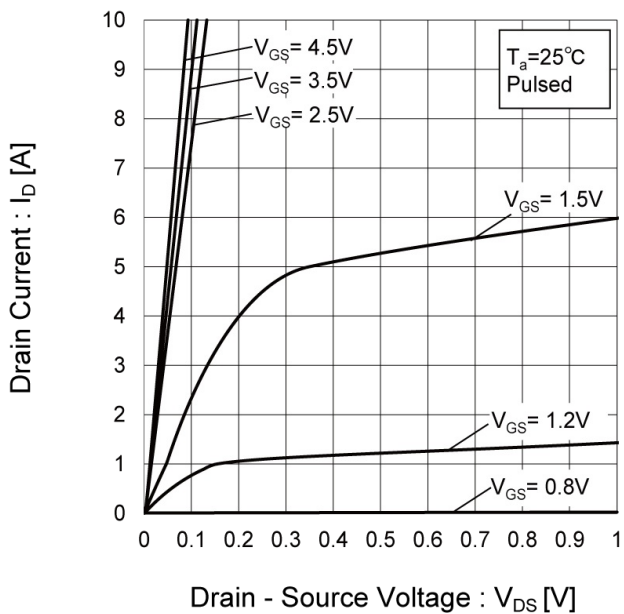


Fig.6 Typical Output Characteristics(II)

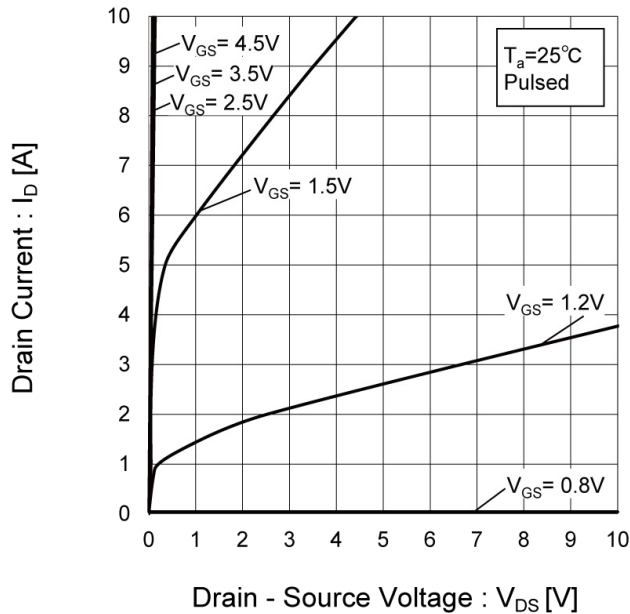
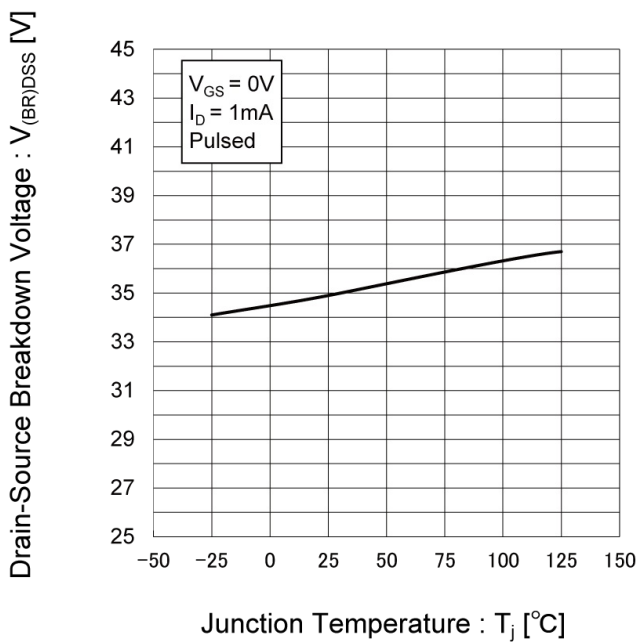


Fig.7 Breakdown Voltage vs. Junction Temperature



● Electrical characteristic curves

Fig.8 Typical Transfer Characteristics

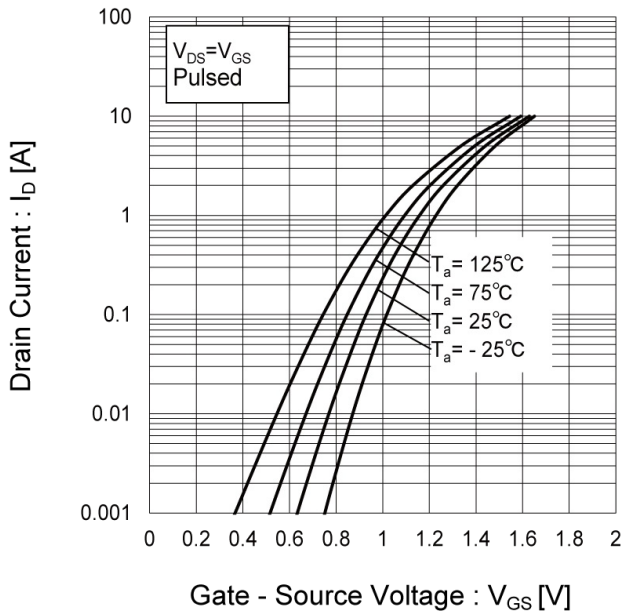


Fig.9 Gate Threshold Voltage vs. Junction Temperature

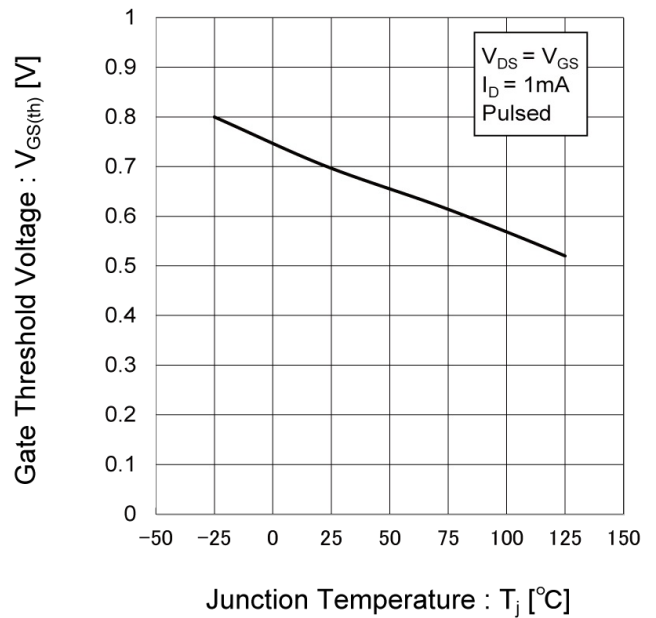
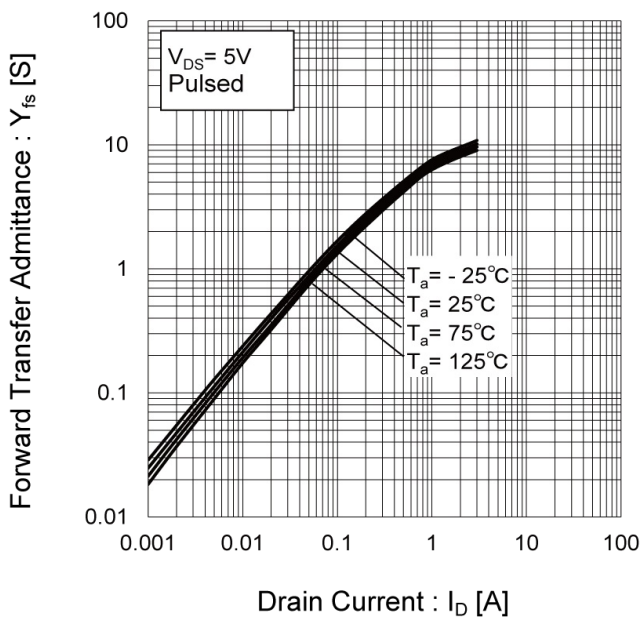


Fig.10 Forward Transfer Admittance vs. Drain Current



● Electrical characteristic curves

Fig.11 Drain Current Derating Curve

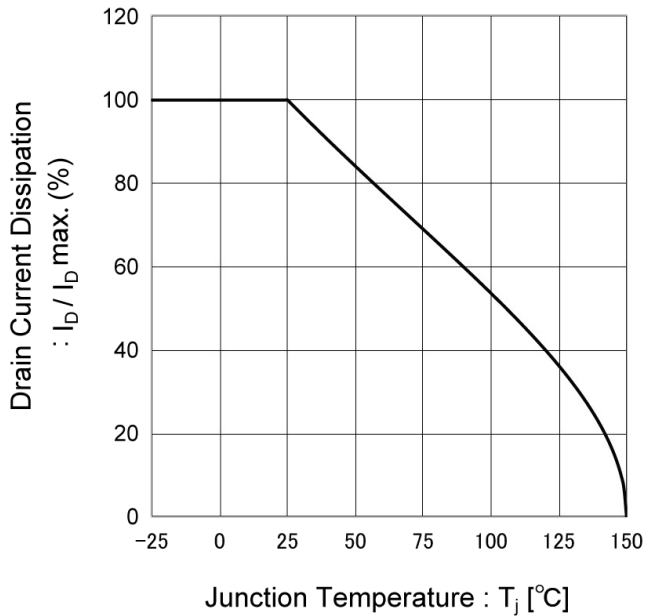


Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

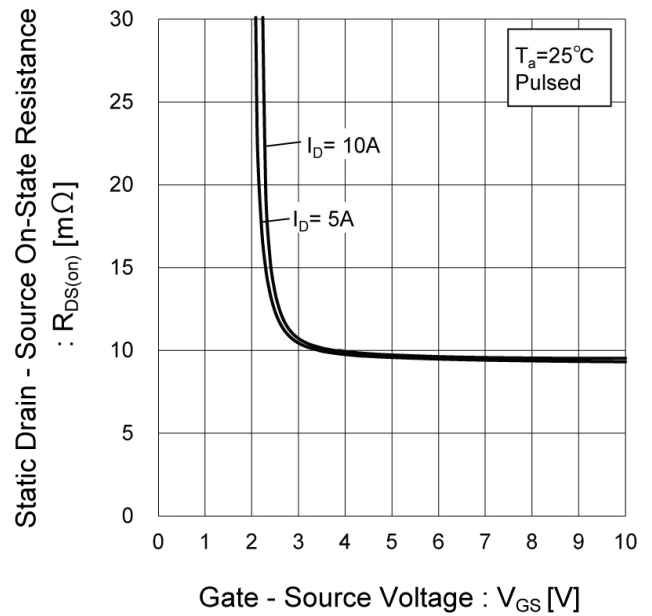
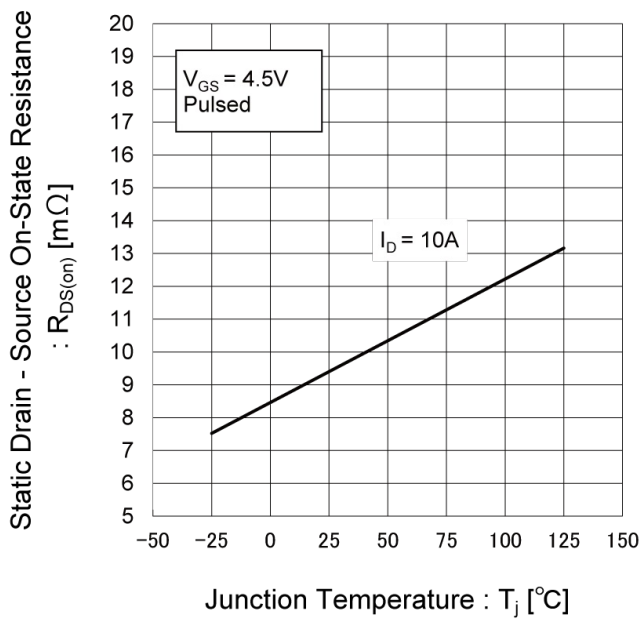


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature



● Electrical characteristic curves

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

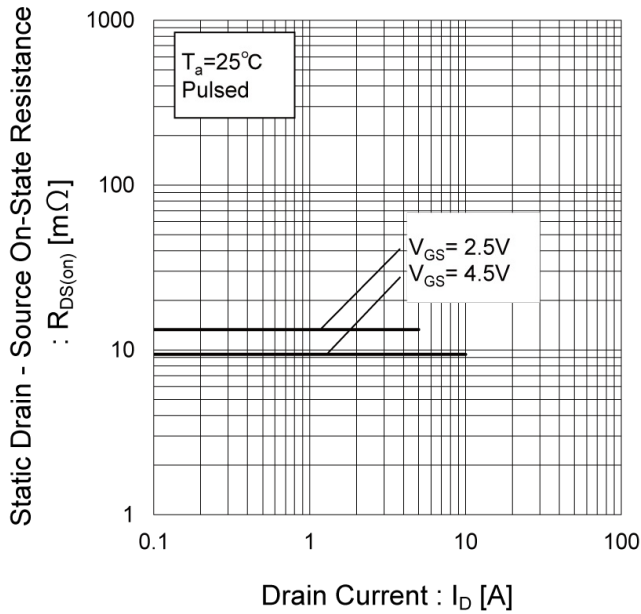


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current (II)

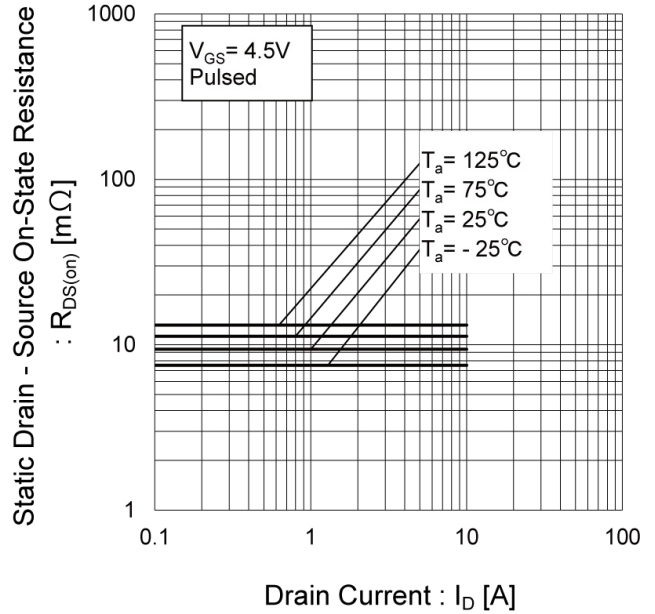
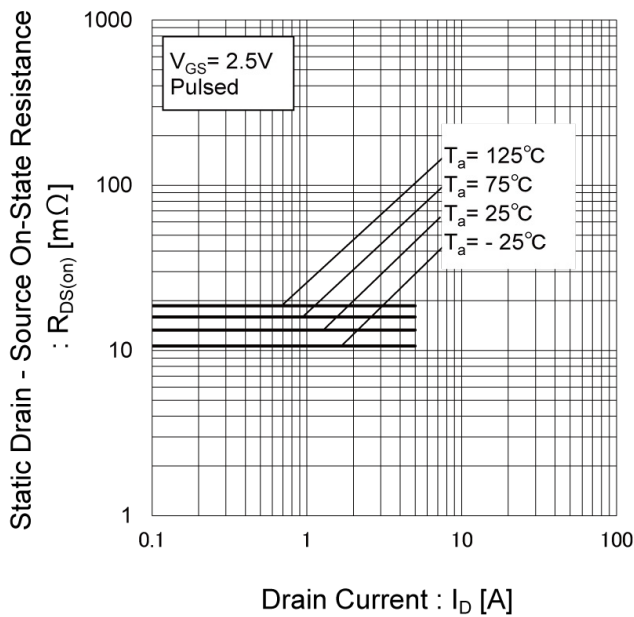


Fig.16 Static Drain - Source On - State Resistance vs. Drain Current (III)



● Electrical characteristic curves

Fig.17 Typical Capacitance vs. Drain - Source Voltage

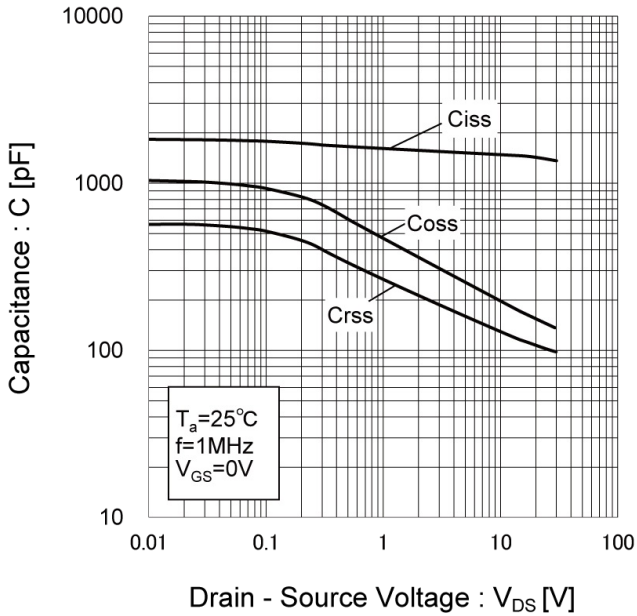


Fig.18 Switching Characteristics

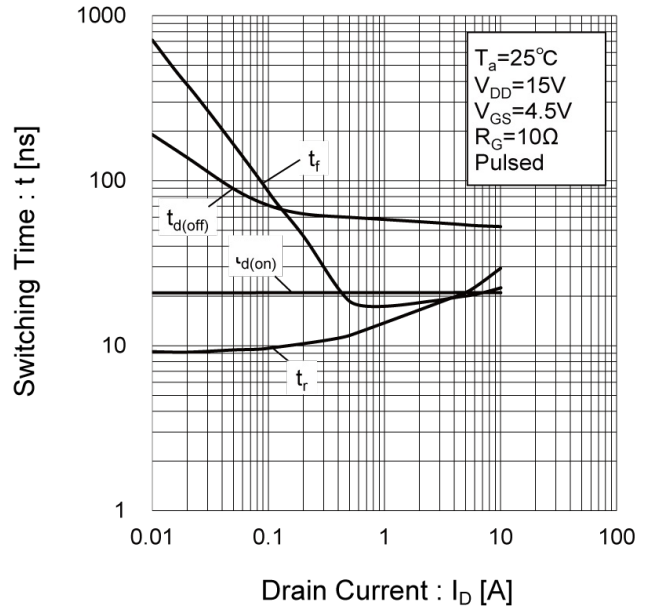


Fig.19 Dynamic Input Characteristics

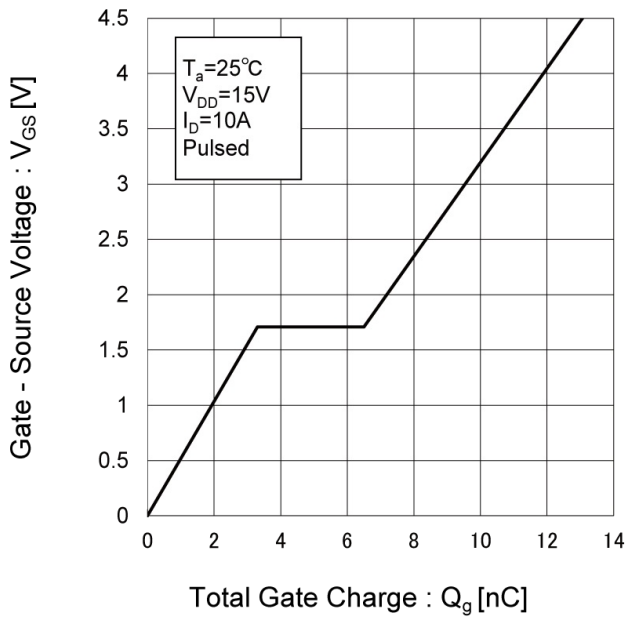
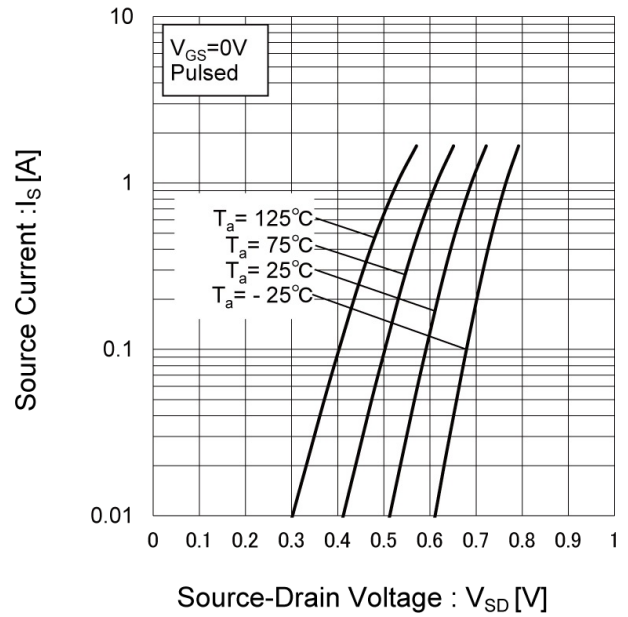


Fig.20 Source Current vs. Source Drain Voltage



● Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

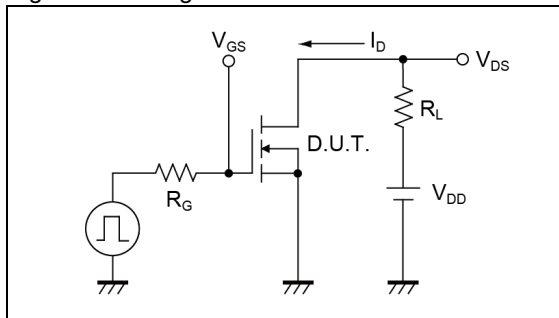


Fig.1-2 Switching Waveforms

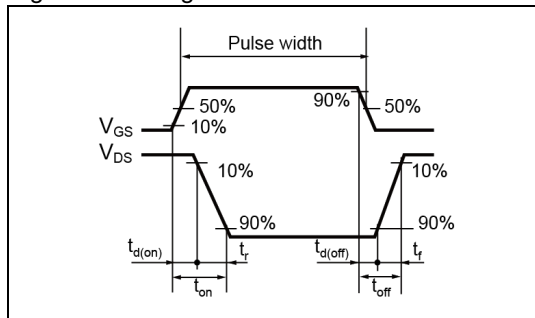


Fig.2-1 Gate Charge Measurement Circuit

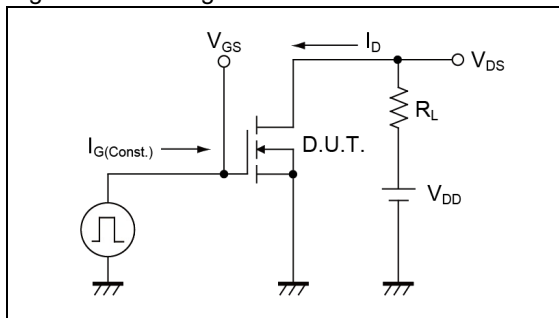


Fig.2-2 Gate Charge Waveform

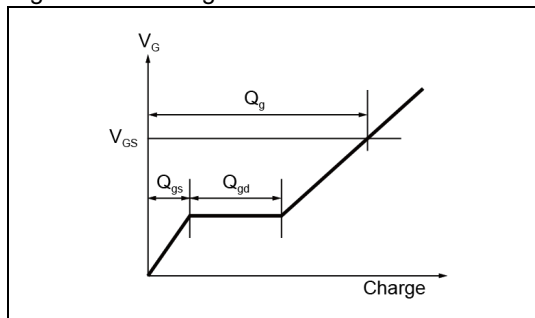


Fig.3-1 Avalanche Measurement Circuit

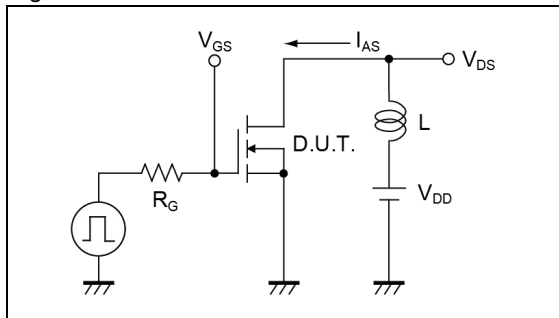
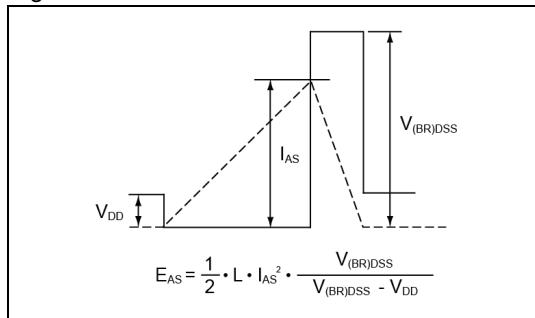


Fig.3-2 Avalanche Waveform



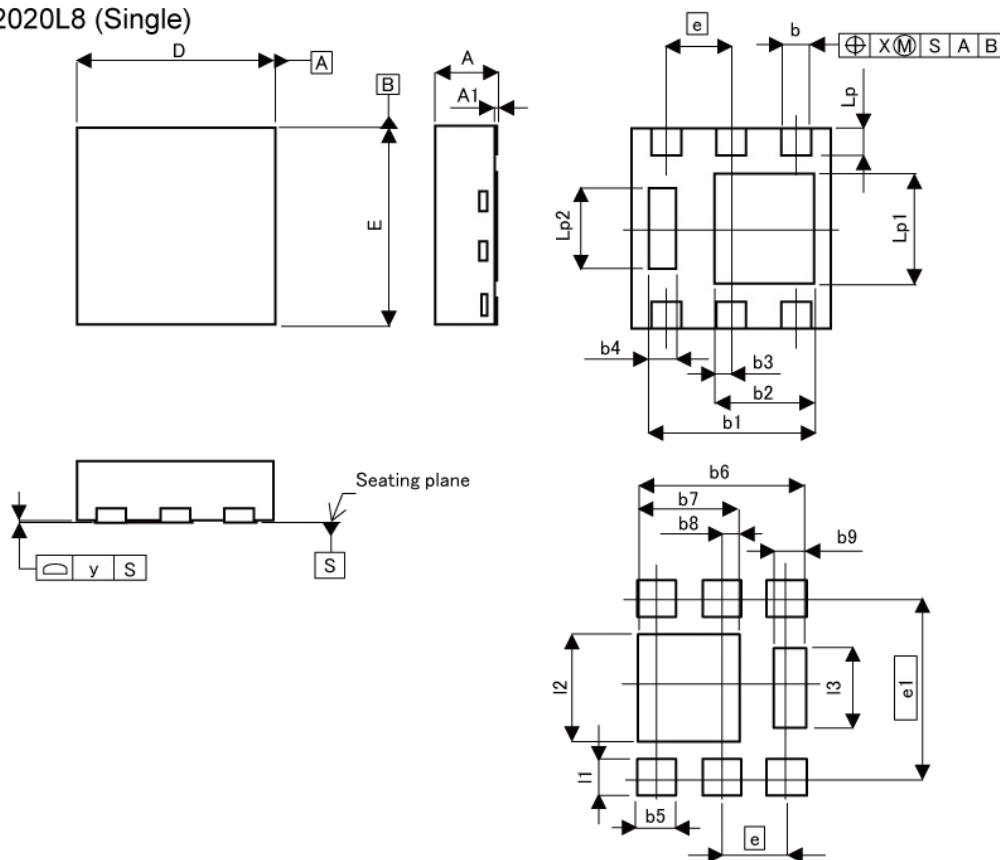
● Notice

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

●Dimensions

DFN2020-8S

HUML2020L8 (Single)



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