HS8K11

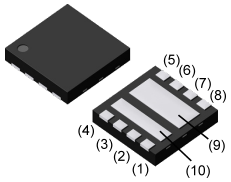
30V Nch+Nch Power MOSFET

Datasheet

Symbol	Tr1:Nch	Tr2:Nch
V_{DSS}	30V	30V
$R_{DS(on)}$(Max.)	17.9mΩ	13.3mΩ
I_D	±7A	±11A
P_D	2W	

●Outline

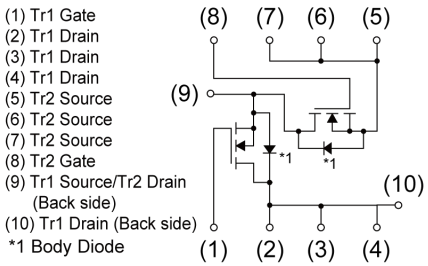
HSML3030L10



●Features

1) Low on - resistance.
2) Pb-free lead plating ; RoHS compliant.
3) Halogen Free.

●Inner circuit



●Application

Switching

●Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8.0
	Basic ordering unit (pcs)	3000
	Taping code	TB
	Marking	HS8K11

●Absolute maximum ratings (T_a = 25°C) ,unless otherwise specified.

Parameter	Symbol	Value		Unit
		Tr1:Nch	Tr2:Nch	
Drain - Source voltage	V_{DSS}	30	30	V
Continuous drain current	I_D	±7	±11	A
Pulsed drain current	$I_{D,pulse}$ *1	±28	±44	A
Gate - Source voltage	V_{GSS}	±20	±12	V
Avalanche energy, single pulse	E_{AS} *2	3.6	9.3	mJ
Avalanche current	I_{AS} *2	7.0	11	A
Power dissipation	P_D *3	2		W
Junction temperature	T_j	150		℃
Range of storage temperature	T_{stg}	-55 to +150		℃

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●Thermal resistance

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

●Electrical characteristics (T_a = 25°C) , unless otherwise specified

Parameter	Symbol	Type	Conditions	Values			Unit
				Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	Tr1	V_{GS} = 0V, I_D = 1mA	30	-	-	V
		Tr2	V_{GS} = 0V, I_D = 1mA	30	-	-	
Breakdown voltage temperature coefficient	$\frac{\Delta V_{(BR)DSS}}{\Delta T_j}$	Tr1	I_D = 1mA, referenced to 25℃	-	20.84	-	mV/℃
		Tr2	I_D = 1mA, referenced to 25℃	-	26.2	-	
Zero gate voltage drain current	I_{DSS}	Tr1	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
		Tr2	V_{DS} = 30V, V_{GS} = 0V	-	-	1	
Gate - Source leakage current	I_{GSS}	Tr1	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
		Tr2	V_{DS} = 0V, V_{GS} = ±12V	-	-	±100	
Gate threshold voltage	$V_{GS(th)}$	Tr1	V_{DS} = V_{GS}, I_D = 1mA	1.0	-	2.5	V
		Tr2	V_{DS} = V_{GS}, I_D = 1mA	1.0	-	2.5	
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	Tr1	I_D = 1mA, referenced to 25℃	-	-3.25	-	mV/℃
		Tr2	I_D = 1mA, referenced to 25℃	-	-3.44	-	
Static drain - source on - state resistance	$R_{DS(on)}$ *4	Tr1	V_{GS} = 10V, I_D = 7A	-	12.8	17.9	mΩ
			V_{GS} = 4.5V, I_D = 7A	-	20.8	29.1	
		Tr2	V_{GS} = 10V, I_D = 11A	-	10.2	13.3	
			V_{GS} = 4.5V, I_D = 11A	-	11.8	15.4	
Gate input resistance	R_G	Tr1		-	1.3	-	Ω
		Tr2		-	1.0	-	
Transconductance	g_{fs} *4	Tr1	V_{DS} = 5V, I_D = 7A	4.5	-	-	S
		Tr2	V_{DS} = 5V, I_D = 11A	7.5	-	-	

*1 Pw ≦ 10μs, Duty cycle ≦ 1%

*2 L ≃ 0.1mH, V_{DD} = 15V, R_G = 25Ω, STARTING T_{ch} = 25℃ Fig.3-1,3-2

*3 Mounted on 40mm×40mm Cu BOARD

*4 Pulsed

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●Electrical characteristics (T_a = 25°C)

<Tr1>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	500	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	80	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	65	-	
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} ≃ 15V, V_{GS} = 10V	-	9.4	-	ns
Rise time	t_r *4	I_D = 3.5A	-	10.8	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 4.3Ω	-	26.8	-	
Fall time	t_f *4	R_G = 10Ω	-	5.1	-	

<Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	1230	-	pF
Output capacitance	C_{oss}	V_{DS} = 15V	-	125	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	95	-	
Turn - on delay time	$t_{d(on)}$ *4	V_{DD} ≃ 15V, V_{GS} = 10V	-	13.6	-	ns
Rise time	t_r *4	I_D = 5.5A	-	15.0	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 2.72Ω	-	47.3	-	
Fall time	t_f *4	R_G = 10Ω	-	7.5	-	

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●Gate charge characteristics (T_a = 25°C)

<Tr1>

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g*4	V_{DD} ≃ 15V I_D = 7A	V_{GS} = 10V	-	11.1	-	nC
			V_{GS} = 4.5V	-	5.7	-	
Gate - Source charge	Q_{gs}*4			-	2.4	-	
Gate - Drain charge	Q_{gd}*4			-	2.1	-	

<Tr2>

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g*4	V_{DD} ≃ 15V I_D = 11A	V_{GS} = 10V	-	20.2	-	nC
			V_{GS} = 4.5V	-	9.0	-	
Gate - Source charge	Q_{gs}*4			-	3.4	-	
Gate - Drain charge	Q_{gd}*4			-	3.1	-	

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

<Tr1>

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}*1		-	-	28	
Forward voltage	V_{SD}*4	V_{GS} = 0V, I_S = 1.67A	-	-	1.2	V
Reverse recovery time	t_{rr}*4	I_S = 7A, V_{GS} = 0V di/dt = 100A/μs	-	17.3	-	ns
Reverse recovery charge	Q_{rr}*4		-	8.1	-	nC

<Tr2>

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}*1		-	-	44	
Forward voltage	V_{SD}*4	V_{GS} = 0V, I_S = 1.67A	-	-	1.2	V
Reverse recovery time	t_{rr}*4	I_S = 11A, V_{GS} = 0V di/dt = 100A/μs	-	17.4	-	ns
Reverse recovery charge	Q_{rr}*4		-	9.5	-	nC

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●Electrical characteristic curves <Tr1>

Fig.1 Power Dissipation Derating Curve

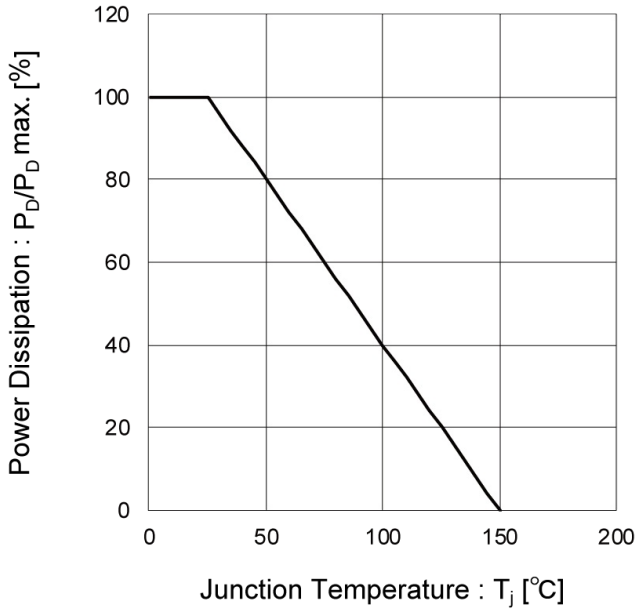
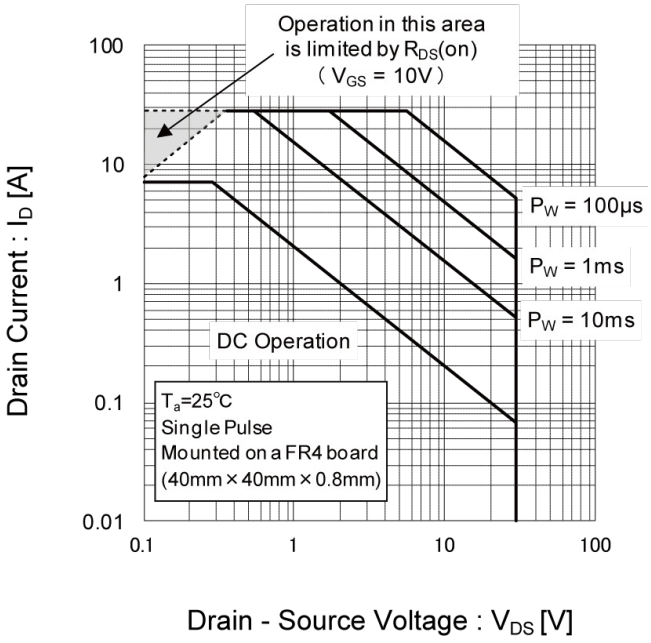


Fig.2 Maximum Safe Operating Area



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●Electrical characteristic curves <Tr1>

Fig.3 Typical Output Characteristics(I)

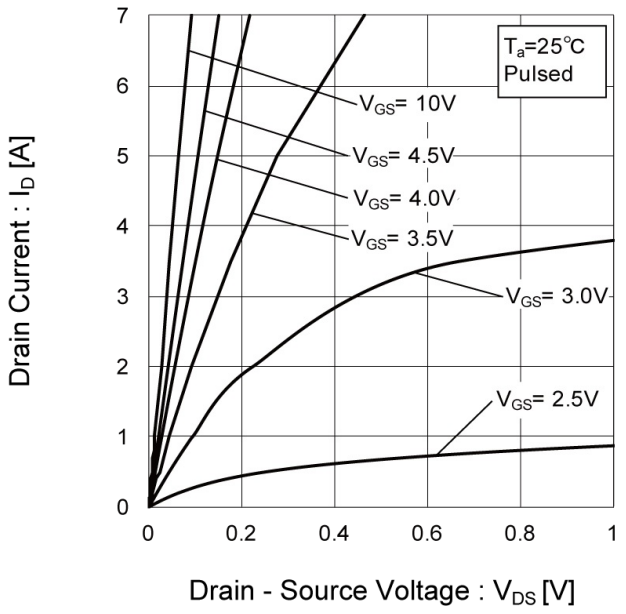


Fig.4 Typical Output Characteristics(II)

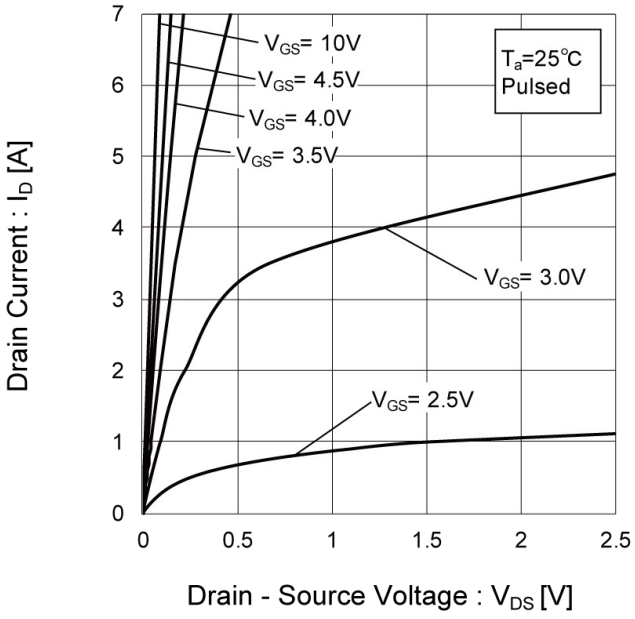


Fig.5 Breakdown Voltage vs. Junction Temperature

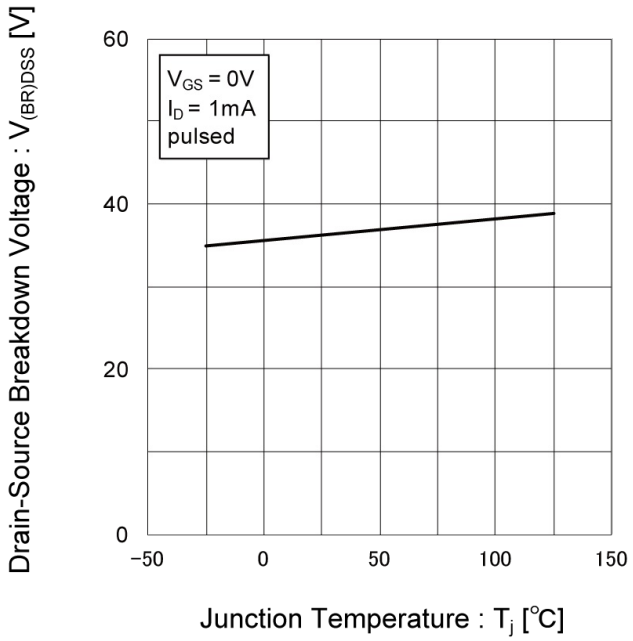
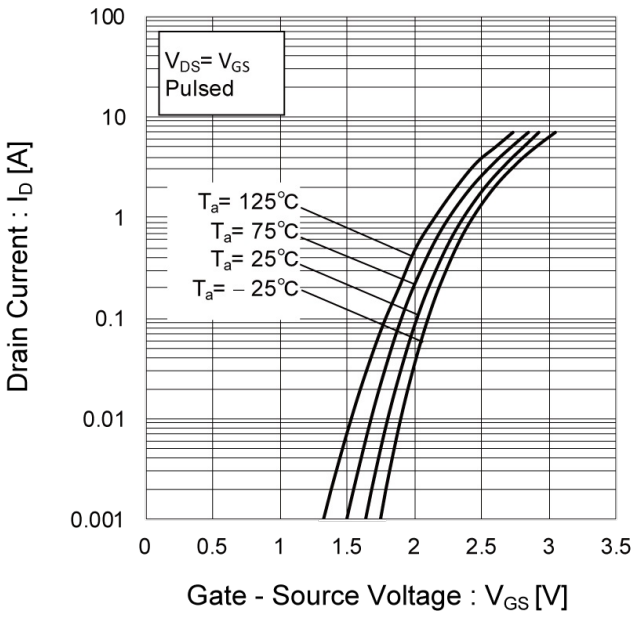


Fig.6 Typical Transfer Characteristics



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●Electrical characteristic curves <Tr1>

Fig.7 Gate Threshold Voltage vs. Junction Temperature

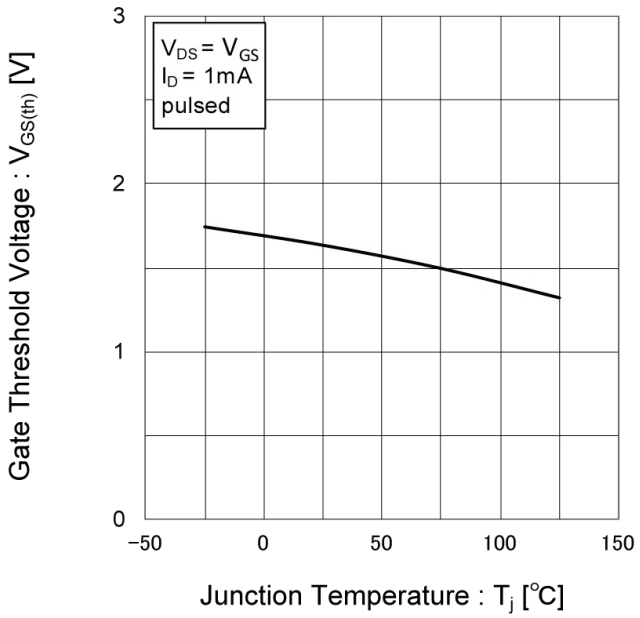


Fig.8 Tranceconductance vs. Drain Current

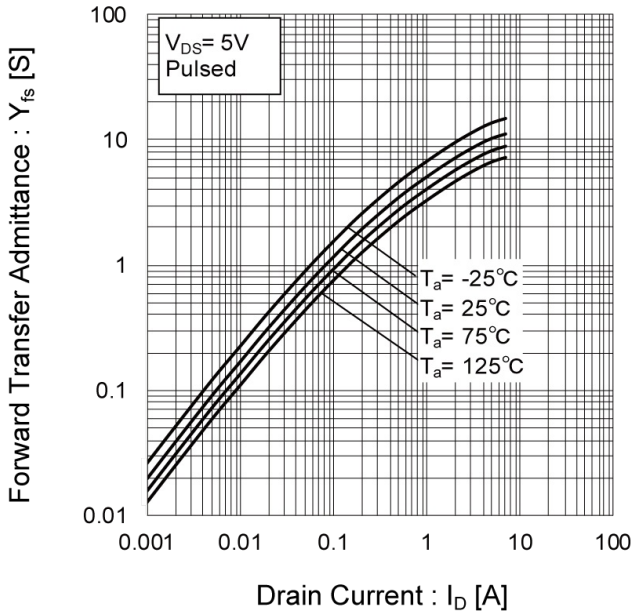


Fig.9 Drain Current Derating Curve

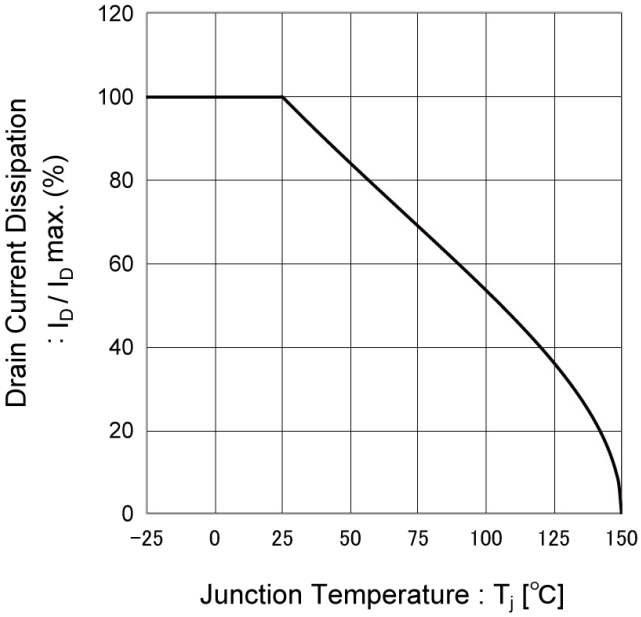
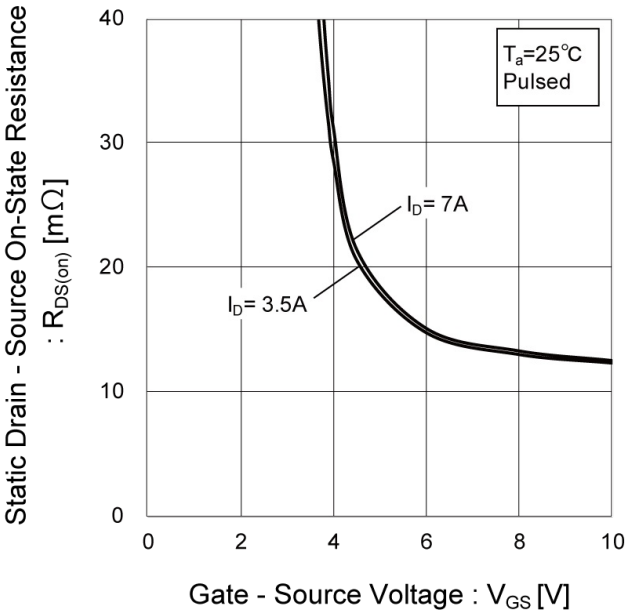


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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●Electrical characteristic curves <Tr1>

Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature

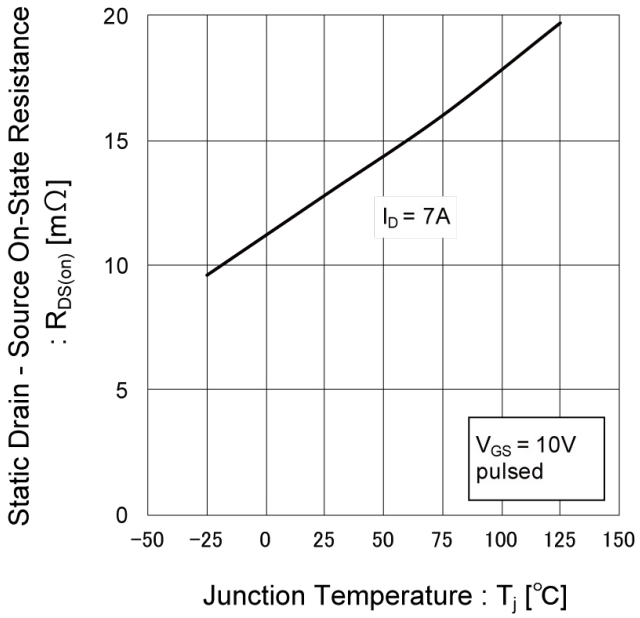


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)

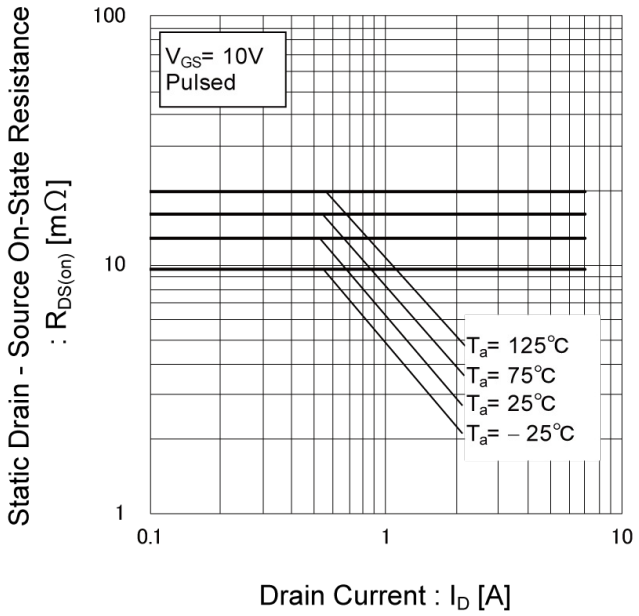
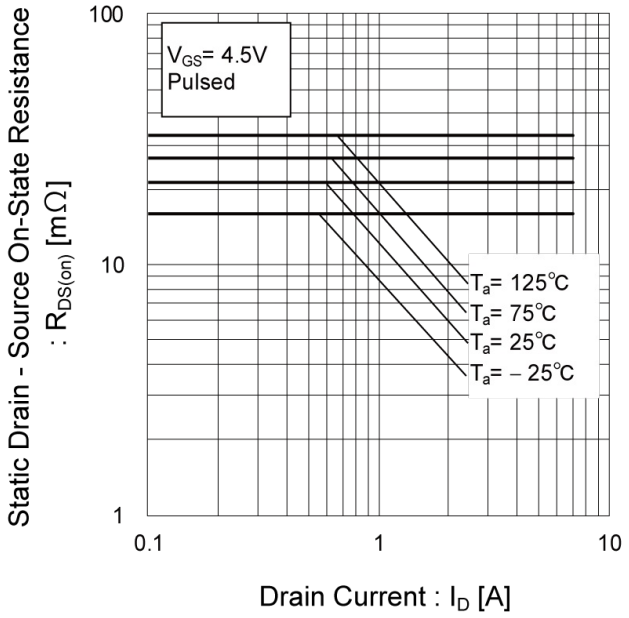


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(II)



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●Electrical characteristic curves <Tr1>

Fig.14 Typical Capacitance vs. Drain - Source Voltage

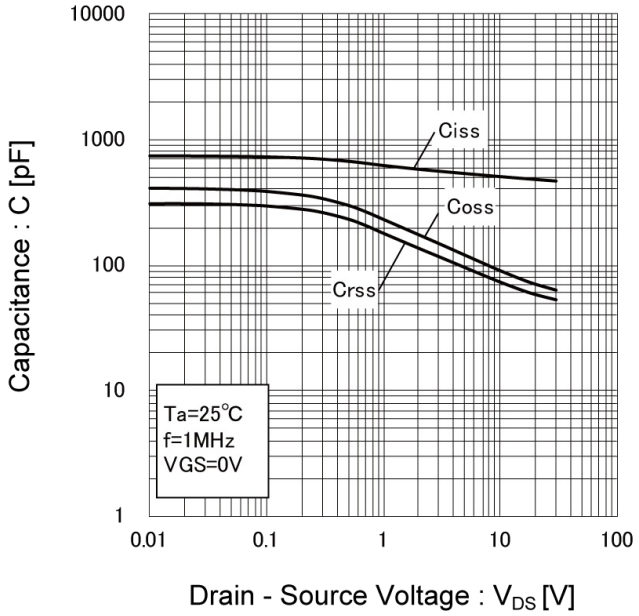


Fig.15 Switching Characteristics

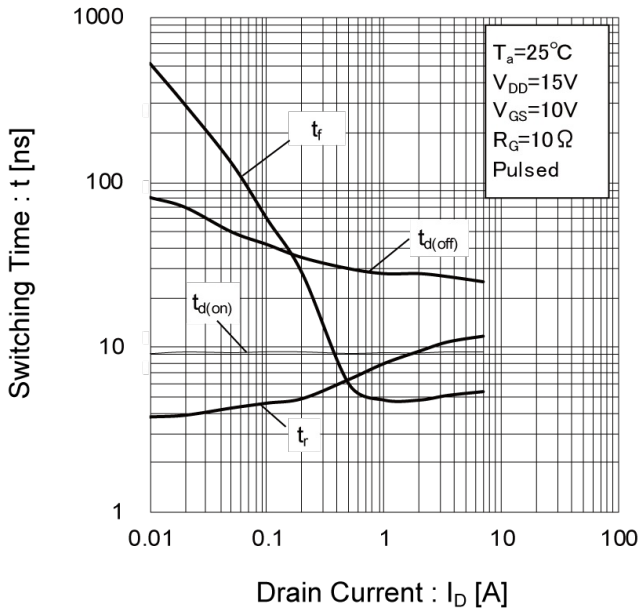


Fig.16 Dynamic Input Characteristics

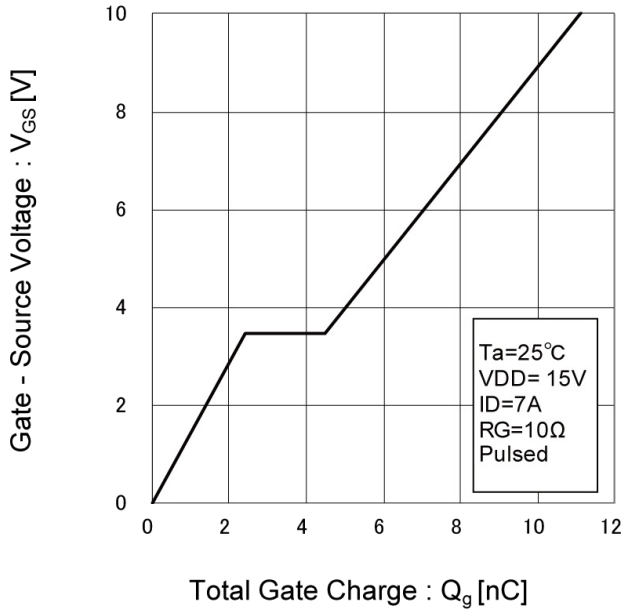
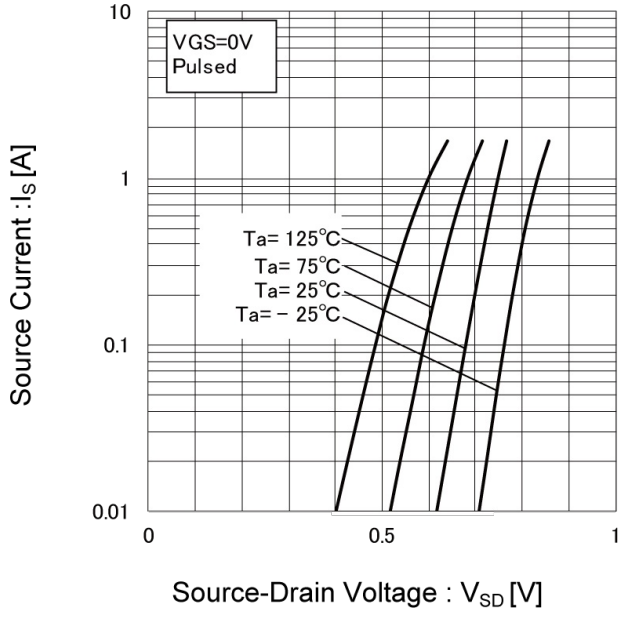


Fig.17 Source Current vs. Source Drain Voltage



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●Electrical characteristic curves <Tr2>

Fig.1 Power Dissipation Derating Curve

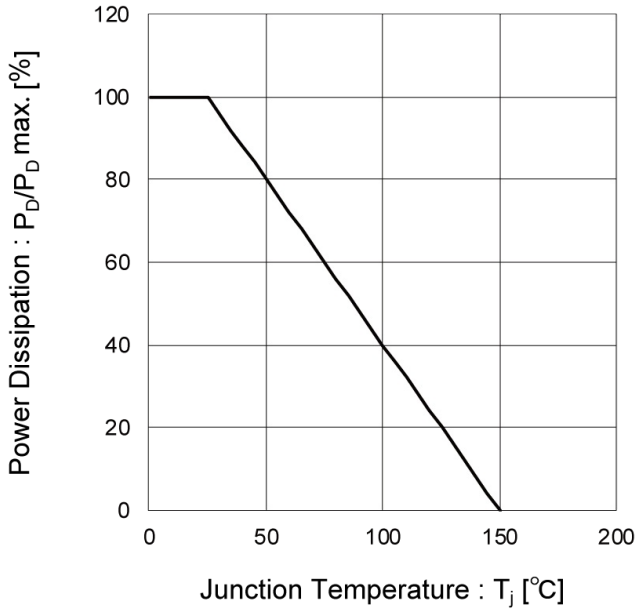
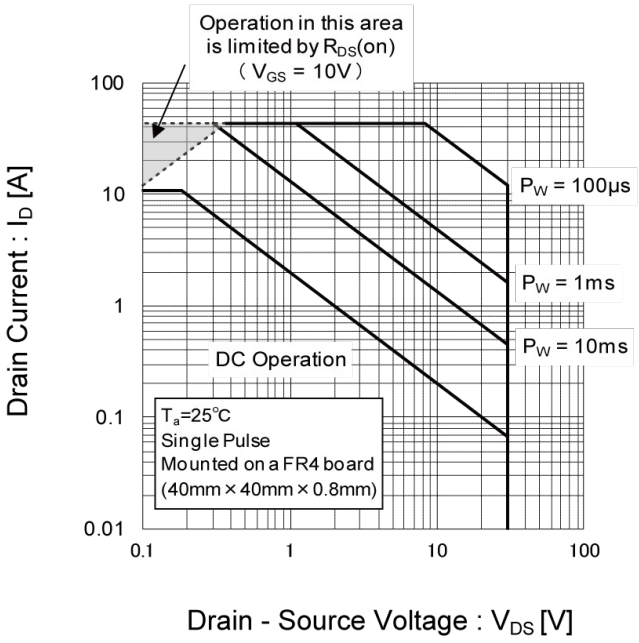


Fig.2 Maximum Safe Operating Area



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●Electrical characteristic curves <Tr2>

Fig.3 Typical Output Characteristics(I)

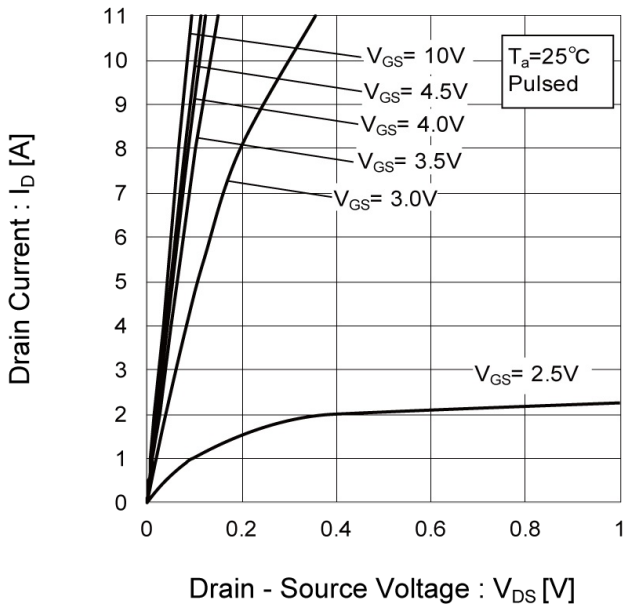


Fig.4 Typical Output Characteristics(II)

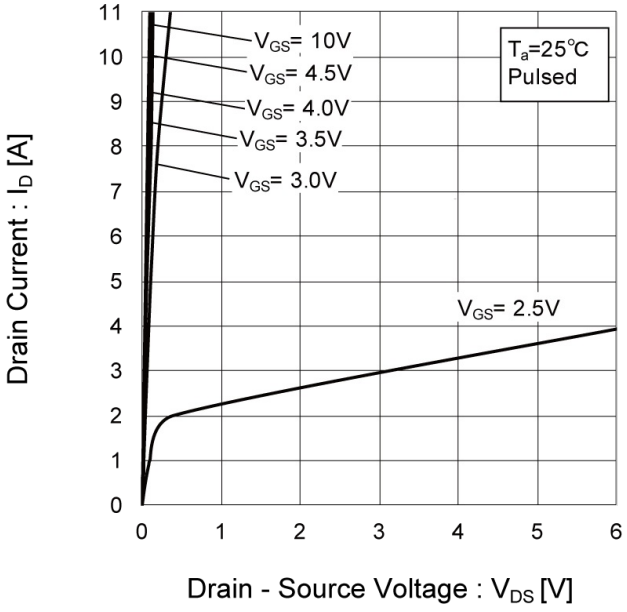


Fig.5 Breakdown Voltage vs. Junction Temperature

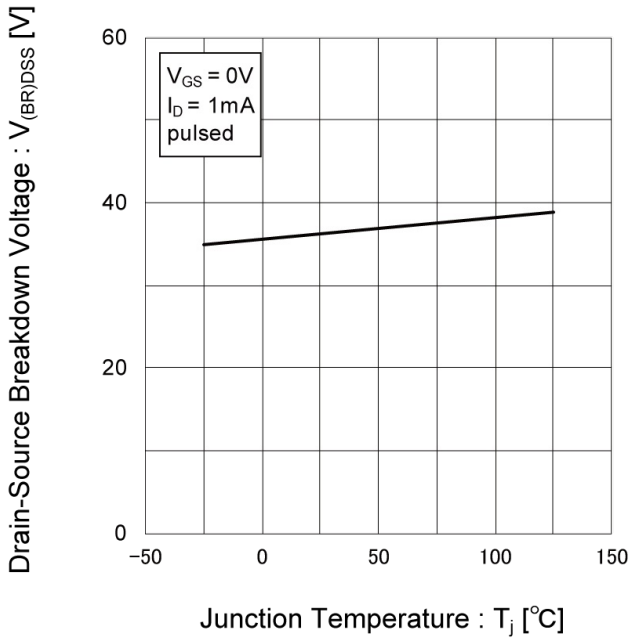
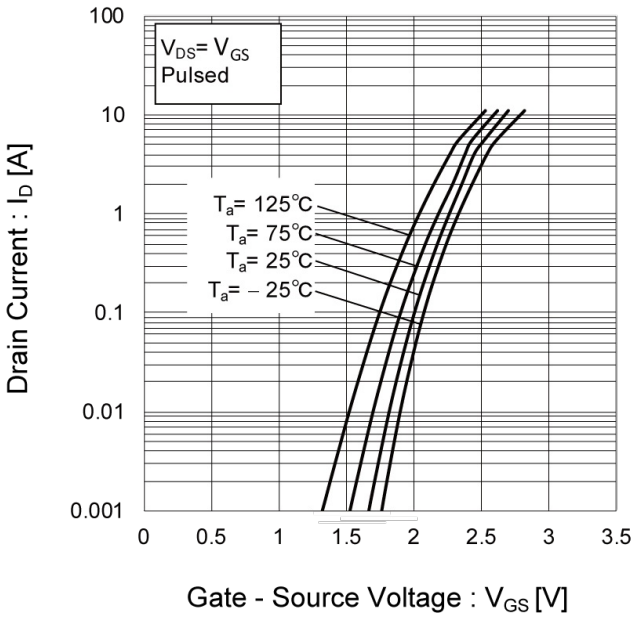


Fig.6 Typical Transfer Characteristics



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●Electrical characteristic curves <Tr2>

Fig.7 Gate Threshold Voltage vs. Junction Temperature

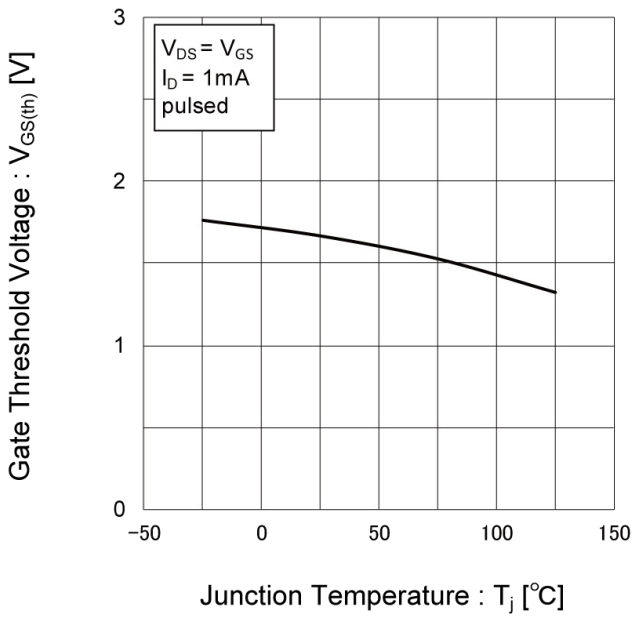


Fig.8 Tranceconductance vs. Drain Current

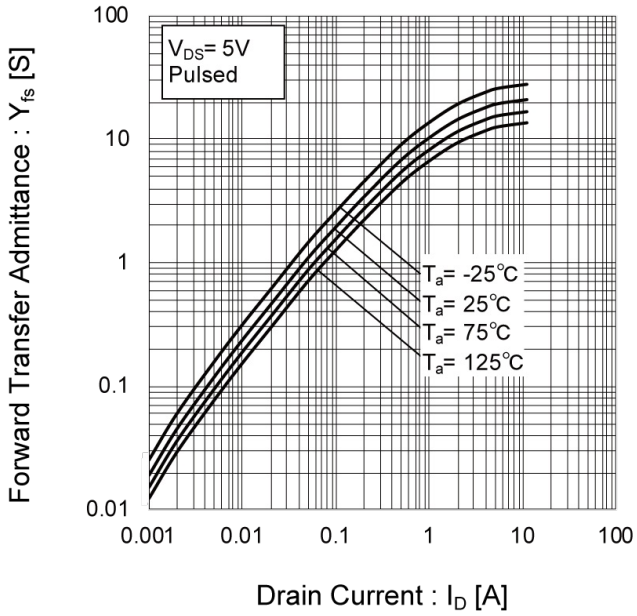


Fig.9 Drain Current Derating Curve

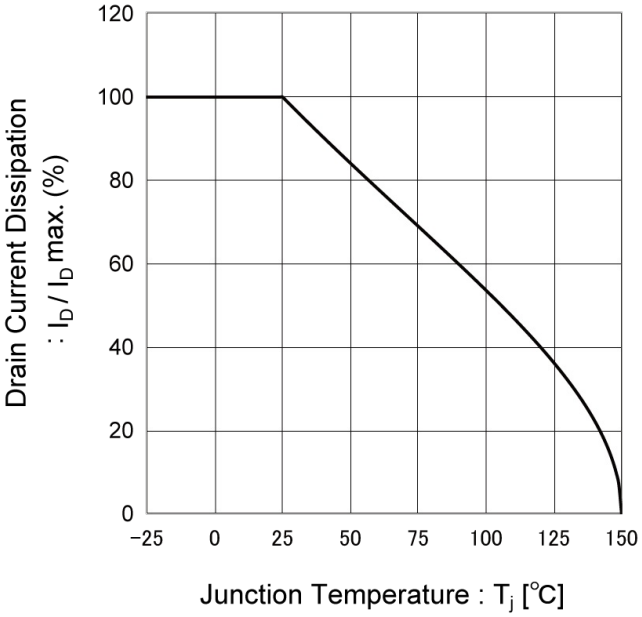
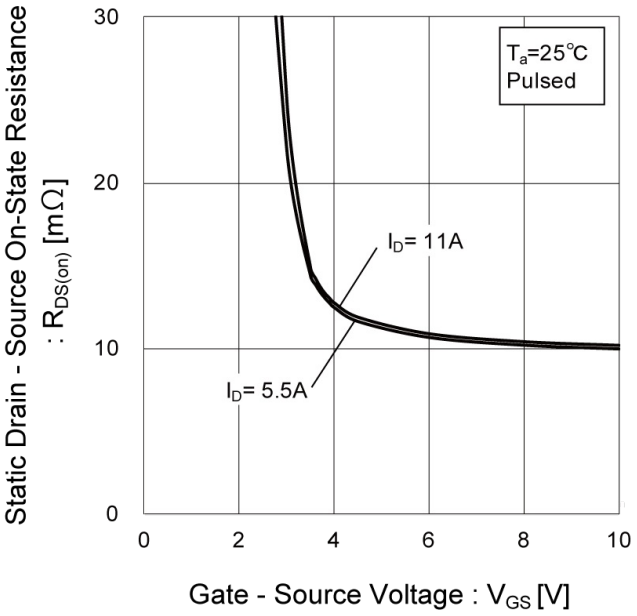


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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●Electrical characteristic curves <Tr2>

Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature

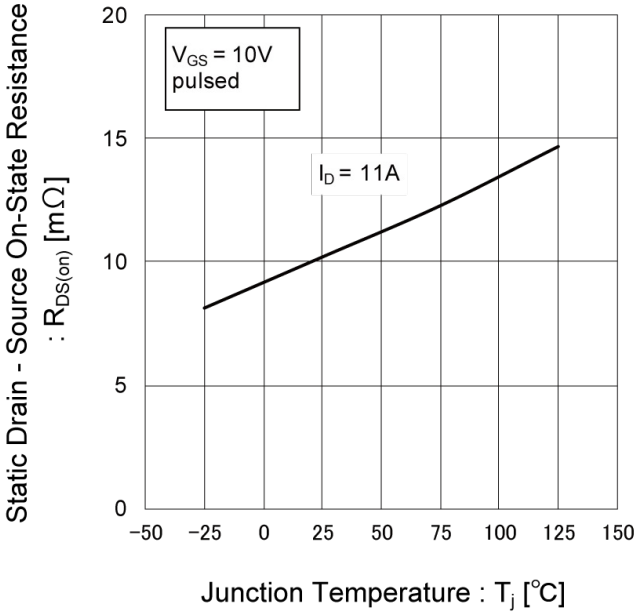


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)

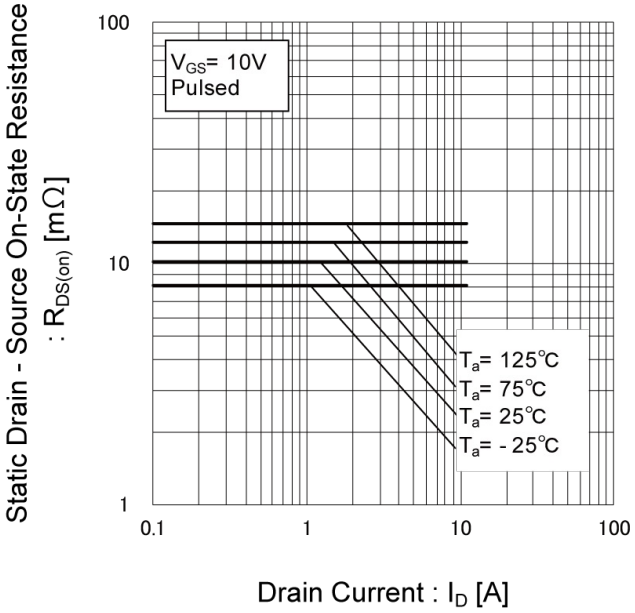
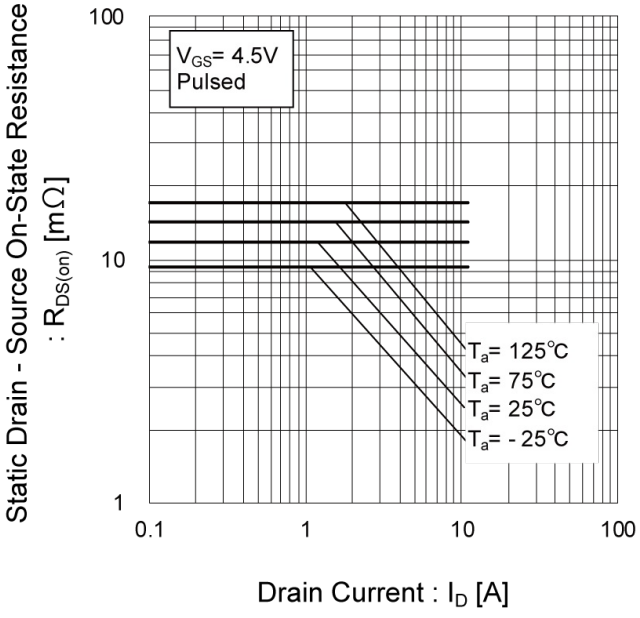


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(II)



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●Electrical characteristic curves <Tr2>

Fig.14 Typical Capacitance vs. Drain - Source Voltage

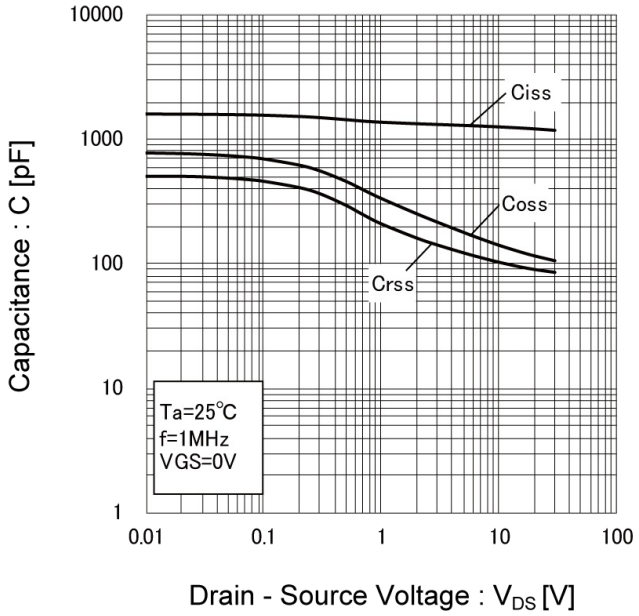


Fig.15 Switching Characteristics

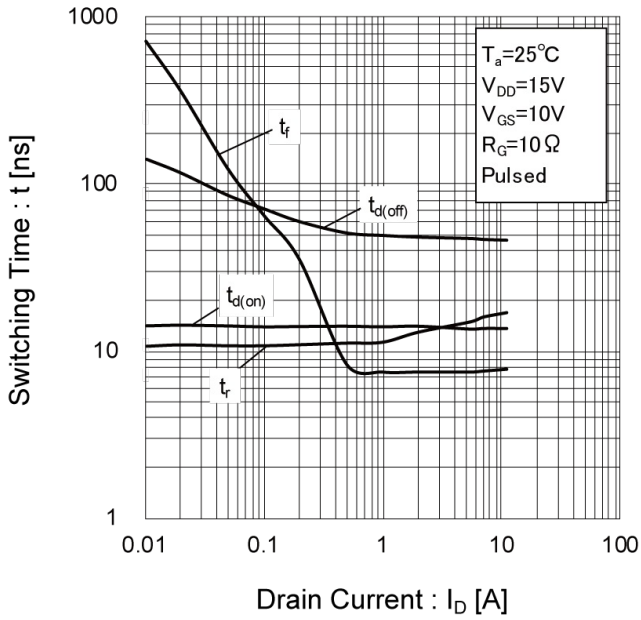


Fig.16 Dynamic Input Characteristics

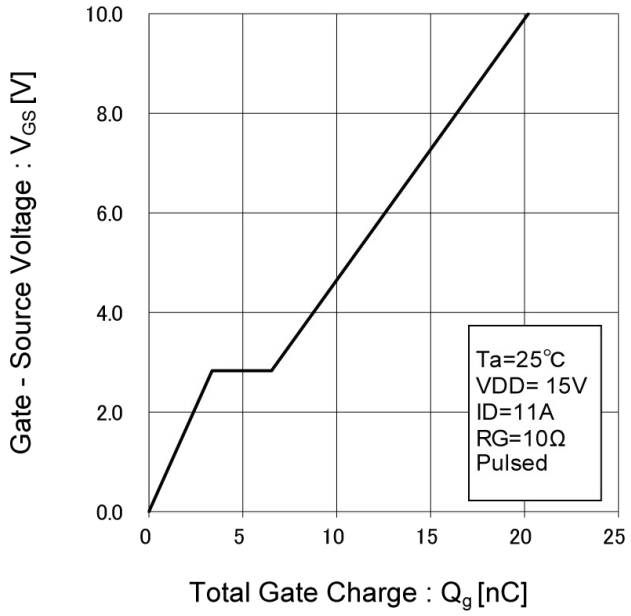
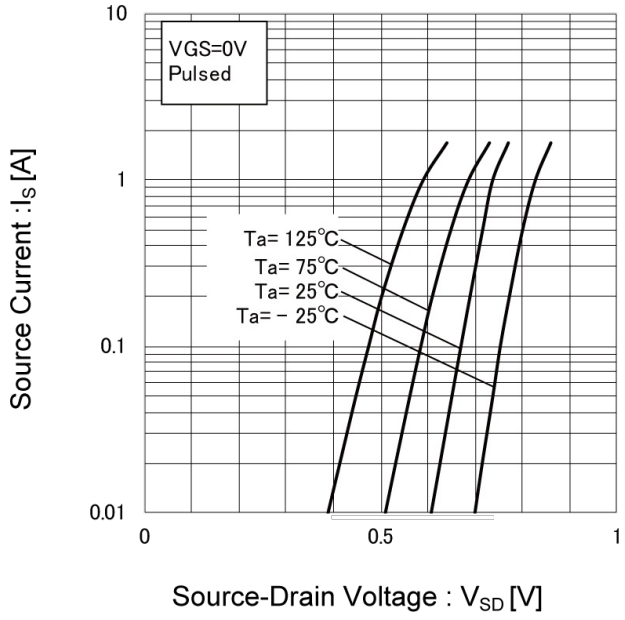


Fig.17 Source Current vs. Source Drain Voltage



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●Measurement circuits <It is the same for the Tr1 and Tr2>

Fig.1-1 Switching Time Measurement Circuit

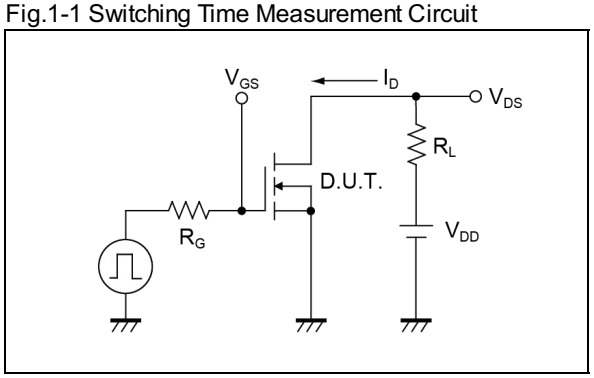


Fig.1-2 Switching Waveforms

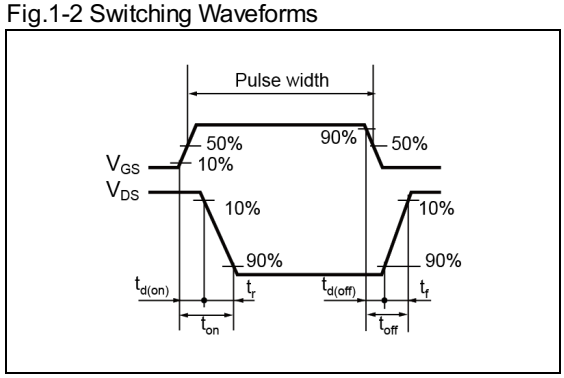


Fig.2-1 Gate Charge Measurement Circuit

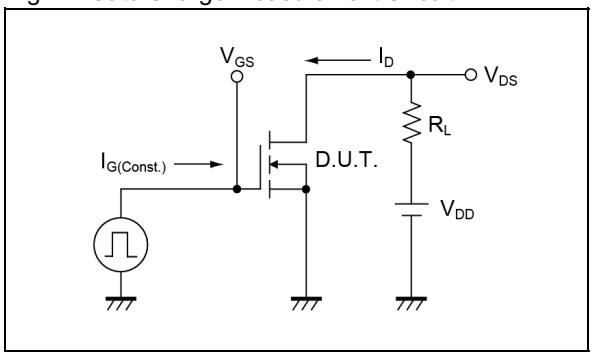


Fig.2-2 Gate Charge Waveform

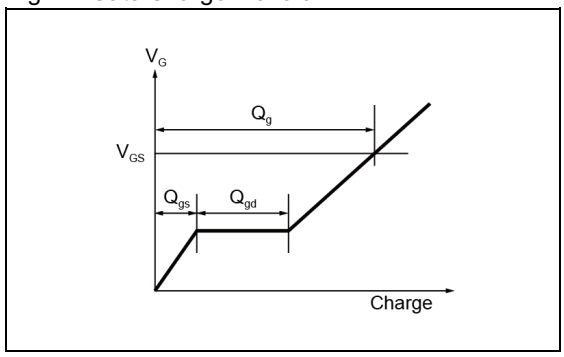


Fig.3-1 Avalanche Measurement Circuit

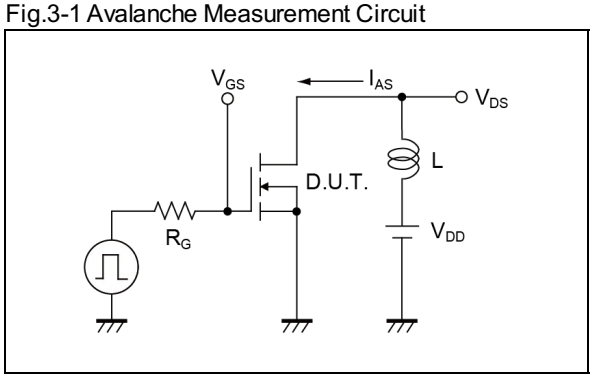
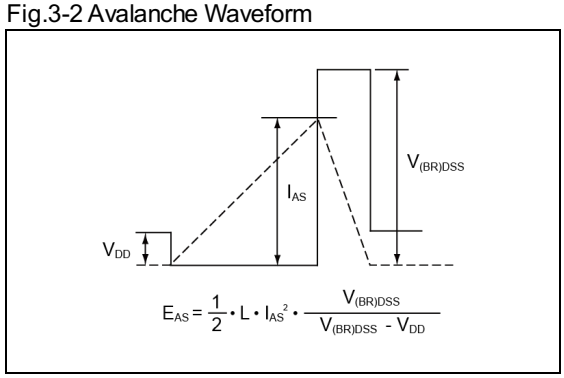


Fig.3-2 Avalanche Waveform



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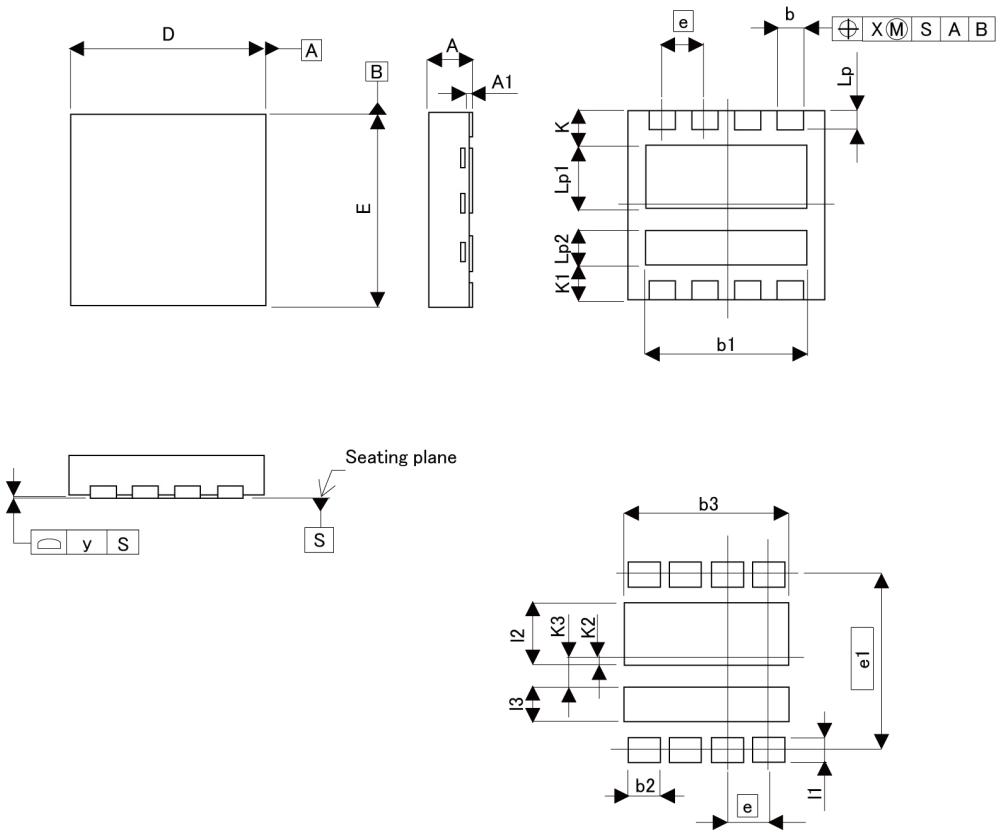
●Dimensions

HSML3030L10



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	0.35	0.45	0.014	0.018
b1	2.30	2.50	0.091	0.098
D	2.90	3.10	0.114	0.122
E	2.90	3.10	0.114	0.122
e	0.65		0.026	
Lp	0.315	0.325	0.012	0.013
Lp1	0.89	1.09	0.035	0.043
Lp2	0.42	0.62	0.017	0.024
K	0.57		0.022	
K1	0.57		0.022	
x	-	0.10	-	0.004
y	-	0.10	-	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
b2	-	0.55	-	0.022
b3	-	2.5	-	0.098
e1	2.68		0.106	
l1	-	0.325	-	0.013
l2	-	0.62	-	0.024
l3	-	1.09	-	0.043
K2	-	0.11	-	0.004
K3	-	0.51	-	0.020

Dimension in mm/inches

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