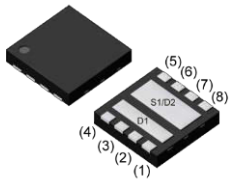
Symbol	Tr1:Nch	Tr2:Nch
V_{DSS}	30V	30V
$R_{DS(on)}$(Max.)	14.6mΩ	12.6mΩ
I_D	±10A	±11A
P_D	2.0W	

Outline

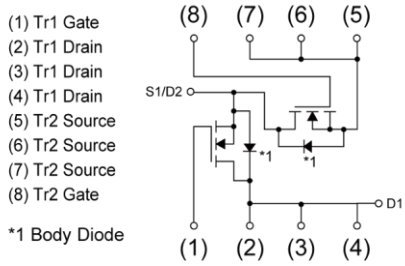
HSML3030L10



Features

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

Inner circuit



Packaging specifications

Type	Packing	Embossed Tape
	Reel size (mm)	180
	Tape width (mm)	8.0
	Basic ordering unit (pcs)	3000
	Taping code	TB
	Marking	HS8S2TB

Application

Switching

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	±10	±11	A
Pulsed drain current	I_{DP}	±40	±44	A
Gate - Source voltage	V_{GSS}	±20	±12	V
Avalanche current, single pulse	I_{AS}	10	11	A
Avalanche energy, single pulse	E_{AS}	3.8	4.8	mJ
Power dissipation	P_D	2.0		W
Junction temperature	T_j	150		°C
Operating junction and storage temperature range	T_{stg}	-55 to +150		°C

Thermal resistance

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

Electrical characteristics (T_a = 25°C)

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°C	-	21	-	mV/°C
		Tr2	I_D = 1mA, referenced to 25°C	-	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	-	-	500	
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	1.2	-	2.5	V
		Tr2	V_{DS} = V_{GS}, I_D = 1mA	1.3	-	2.5	
Gate threshold voltage temperature coefficient	$\frac{\Delta V_{GS(th)}}{\Delta T_j}$	Tr1	I_D = 1mA, referenced to 25°C	-	-3	-	mV/°C
		Tr2	I_D = 1mA, referenced to 25°C	-	-3.44	-	
Static drain - source on - state resistance	$R_{DS(on)}$	Tr1	V_{GS} = 10V, I_D = 7A	-	11.2	14.6	mΩ
			V_{GS} = 4.5V, I_D = 7A	-	14.7	20.0	
		Tr2	V_{GS} = 10V, I_D = 11A	-	10.5	12.6	
			V_{GS} = 4.5V, I_D = 11A	-	12.1	16.5	
Gate resistance	R_G	Tr1	f=1MHz, open drain	-	2	-	Ω
		Tr2		-	1.7	-	
Forward Transfer Admittance	$\|Y_{fs}\|$	Tr1	V_{DS} = 5V, I_D = 7A	5.0	-	-	S
		Tr2	V_{DS} = 5V, I_D = 11A	7	-	-	

*1 Pw ≦ 10μs, Duty cycle ≦ 1%

*2 L ≒ 0.1mH, V_{DD} = 15V, R_G = 25Ω, Starting T_j = 25°C Fig.3-1,3-2

*3 Mounted on a Cu board (40×40×0.8mm)

*4 Pulsed

Electrical characteristics (T_a = 25°C)

<Tr1>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V V_{DS} = 15V	-	348	-	pF
Output capacitance	C_{oss}	f = 1MHz	-	98	-	
Reverse transfer capacitance	C_{rss}		-	25	-	
Turn - on delay time	$t_{d(on)}$	V_{DD} ≃ 15V, V_{GS} = 10V	-	8.2	-	ns
Rise time	T_r	I_D = 5A R_L = 3Ω R_G = 10Ω	-	4.5	-	
Turn - off delay time	$t_{d(off)}$		-	19.2	-	
Fall time	t_f		-	2.9	-	

<Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V V_{DS} = 15V	-	1180	-	pF
Output capacitance	C_{oss}	f = 1MHz	-	110	-	
Reverse transfer capacitance	C_{rss}		-	80	-	
Turn - on delay time	$t_{d(on)}$	V_{DD} ≃ 15V, V_{GS} = 10V	-	12	-	ns
Rise time	t_r	I_D = 5.5A R_L = 2.72Ω R_G = 10Ω	-	7.5	-	
Turn - off delay time	$t_{d(off)}$		-	40	-	
Fall time	t_f		-	10	-	

Gate charge characteristics (T_a = 25°C)

<Tr1>

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g	V_{DD} ≒ 15V I_D = 10A	V_{GS} = 10V	-	6.0	-	nC
			V_{GS} = 4.5V	-	2.7	-	
Gate - Source charge	Q_{gs}			-	1.2	-	
Gate - Drain charge	Q_{gd}			-	0.8	-	

<Tr2>

Parameter	Symbol	Conditions		Values			Unit
				Min.	Typ.	Max.	
Total gate charge	Q_g	V_{DD} ≒ 15V I_D = 11A	V_{GS} = 10V	-	23	-	nC
			V_{GS} = 4.5V	-	12	-	
Gate - Source charge	Q_{gs}			-	3.5	-	
Gate - Drain charge	Q_{gd}			-	3.6	-	

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

<Tr1>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S	T_a = 25°C	-	-	1.67	A
Pulse forward current	I_{SP}		-	-	40	
Forward voltage	V_{SD}	V_{GS} = 0V, I_S = 1.67A	-	-	1.2	V
Reverse recovery time	t_{rr}	I_S = 7A, V_{GS} = 0V di/dt = 100A/μs	-	17.3	-	ns
Reverse recovery charge	Q_{rr}		-	8.1	-	nC

<Tr2>

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Continuous forward current	I_S	T_a = 25°C	-	-	1.67	A
Pulse forward current	I_{SP}		-	-	44	
Forward voltage	V_{SD}	V_{GS} = 0V, I_S = 1.67A	-	0.6	0.8	V
Reverse recovery time	t_{rr}	I_S = 11A, V_{GS} = 0V di/dt = 100A/μs	-	14	-	ns
Reverse recovery charge	Q_{rr}		-	4	-	nC

Electrical characteristic curves
<Tr1>

Fig.1 Power Dissipation Derating Curve

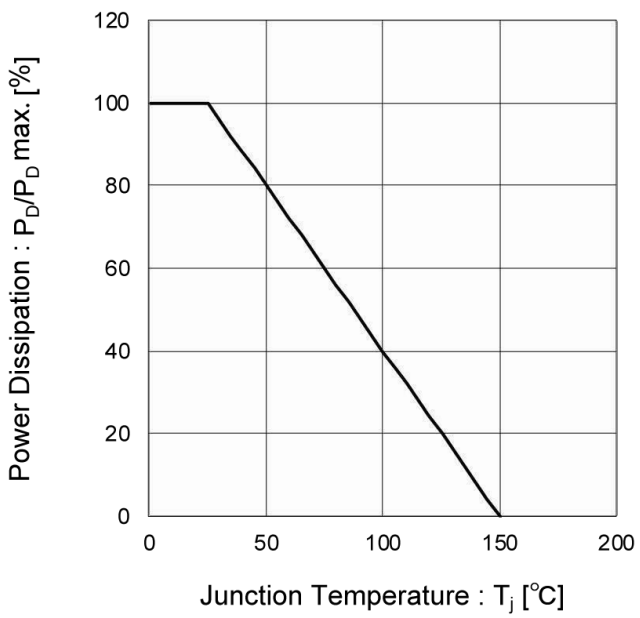
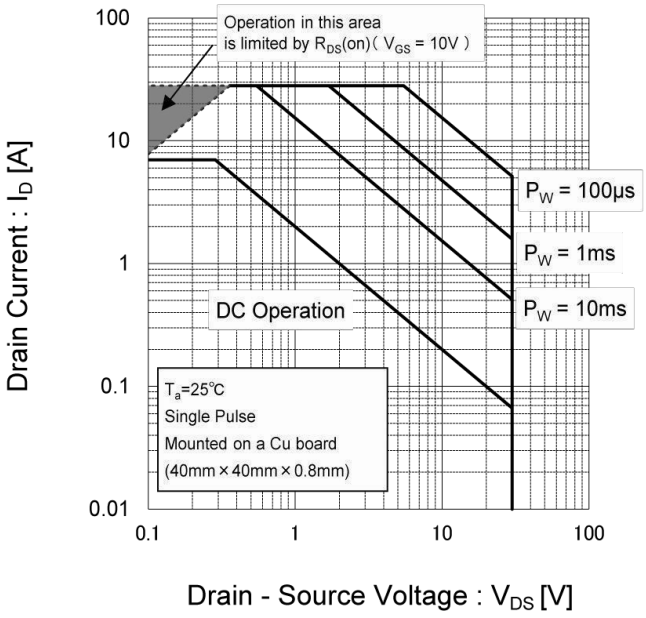


Fig.2 Maximum Safe Operating Area



Electrical characteristic curves
<Tr1>

Fig.3 Typical Output Characteristics(I)

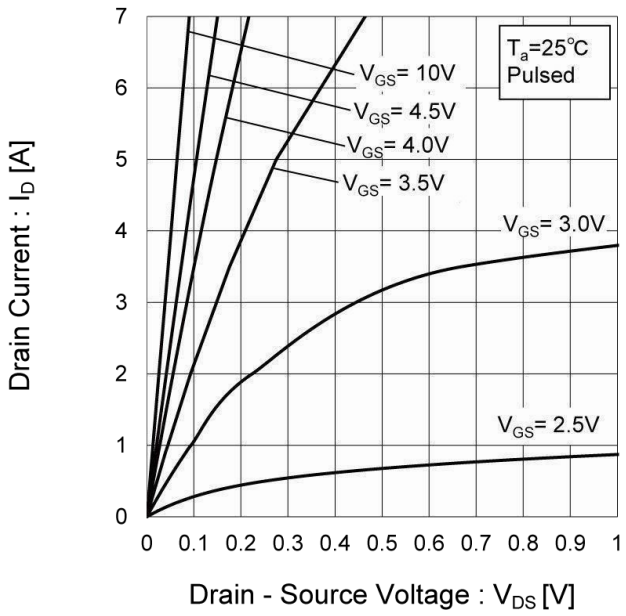


Fig.4 Typical Output Characteristics(II)

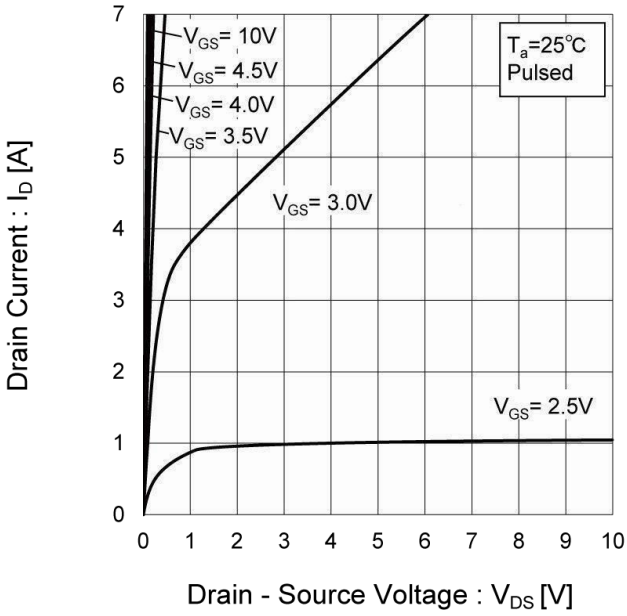


Fig.5 Breakdown Voltage vs. Junction Temperature

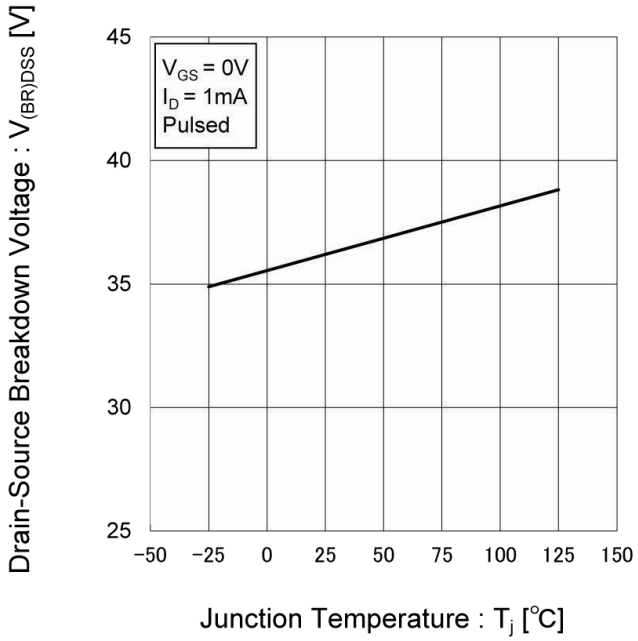
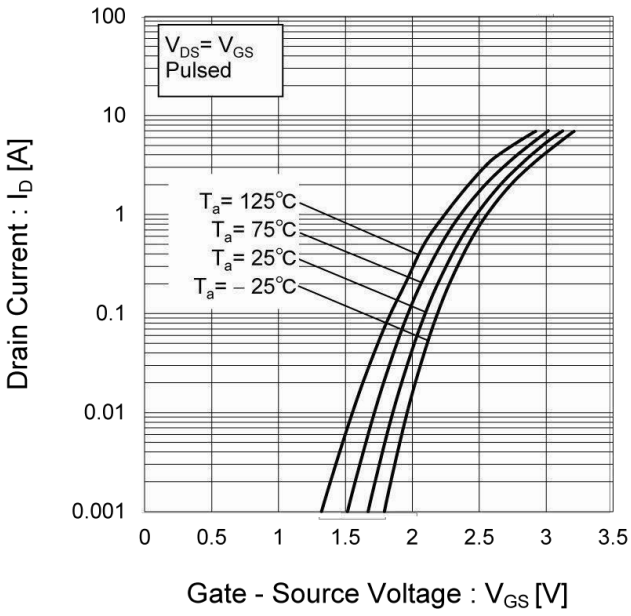


Fig.6 Typical Transfer Characteristics



Electrical characteristic curves
<Tr1>

Fig.7 Gate Threshold Voltage vs. Junction Temperature

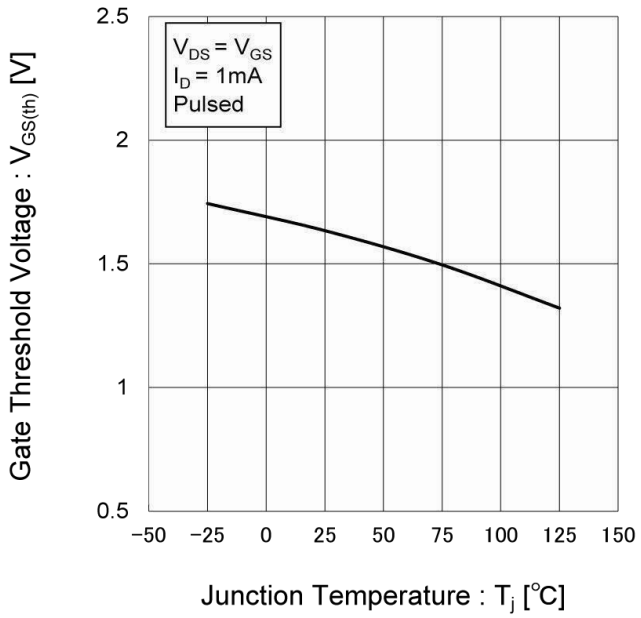


Fig.8 Forward Transfer Admittance vs. Drain Current

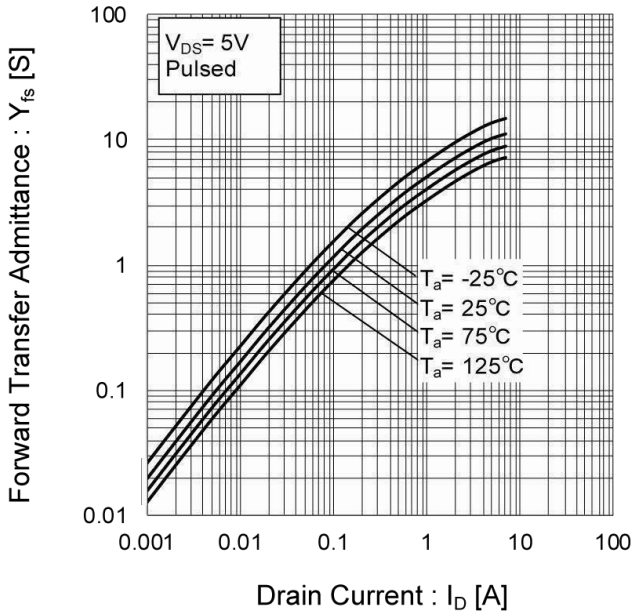


Fig.9 Drain Current Derating Curve

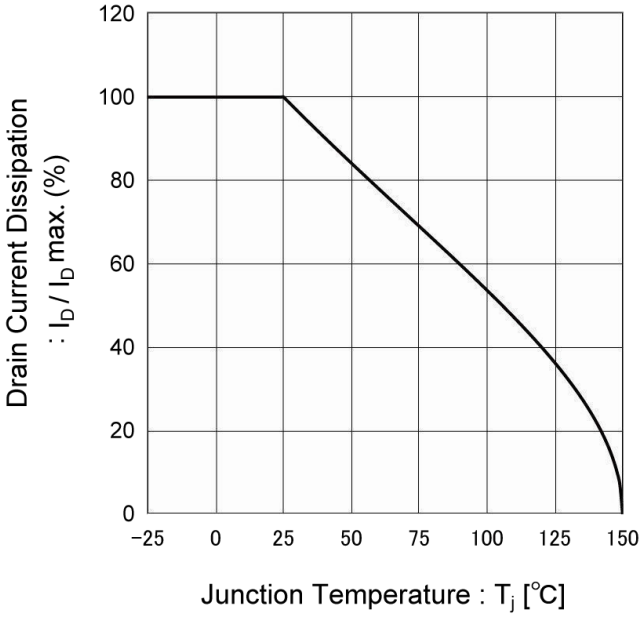
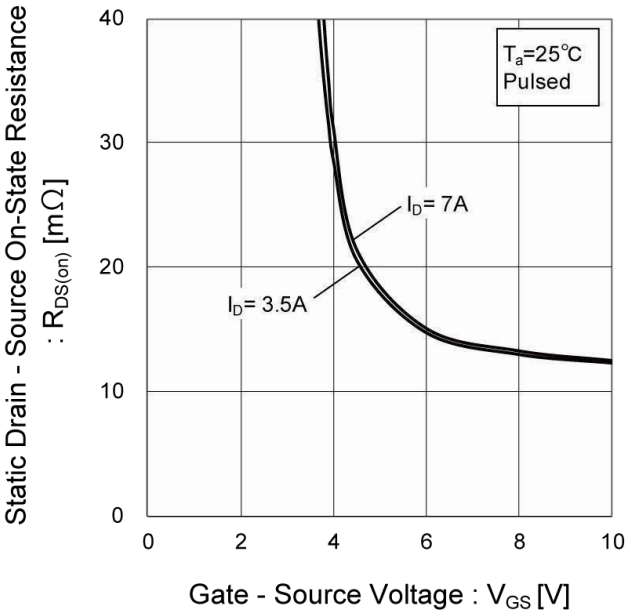


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



Electrical characteristic curves
<Tr1>

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

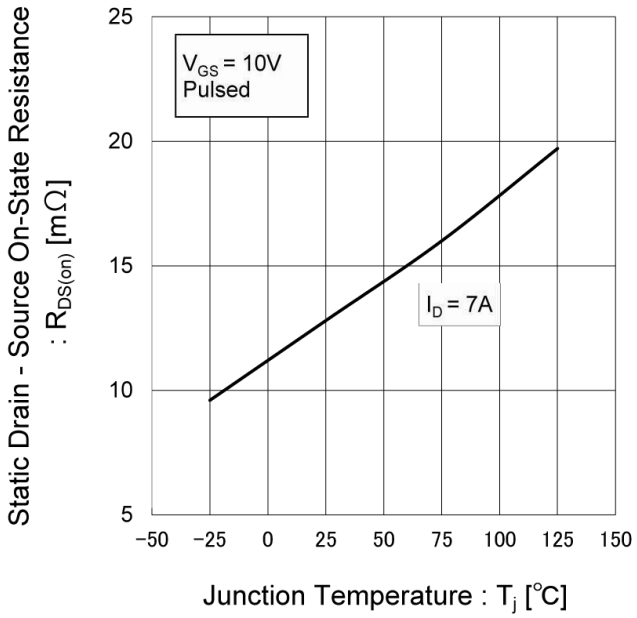


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)

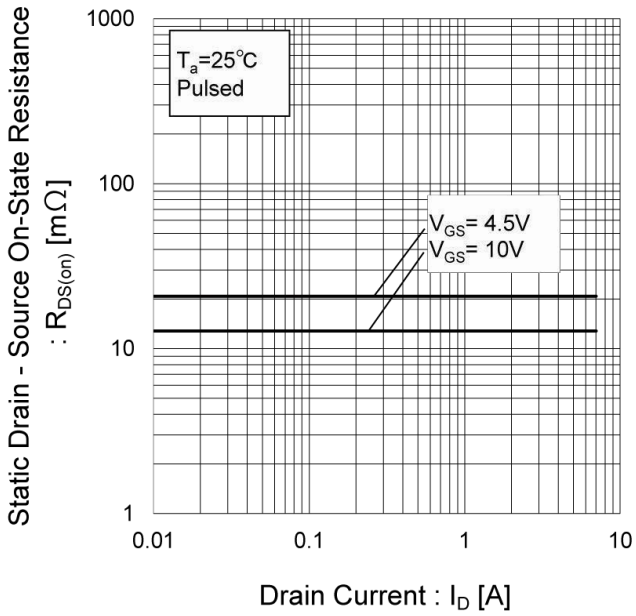


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(II)

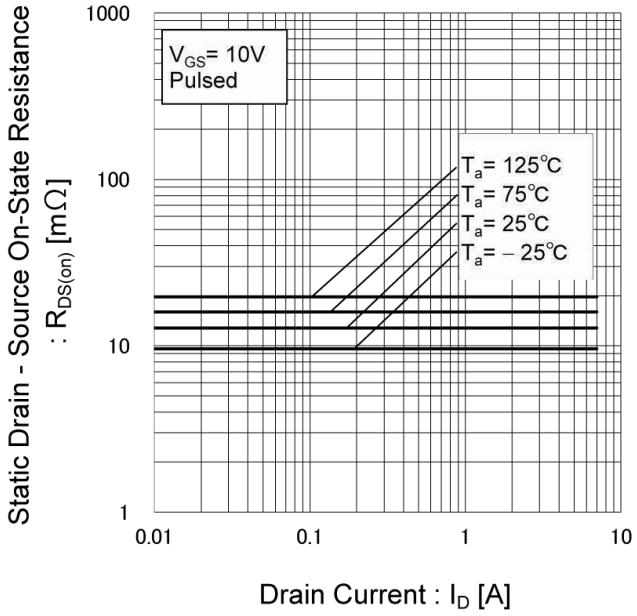
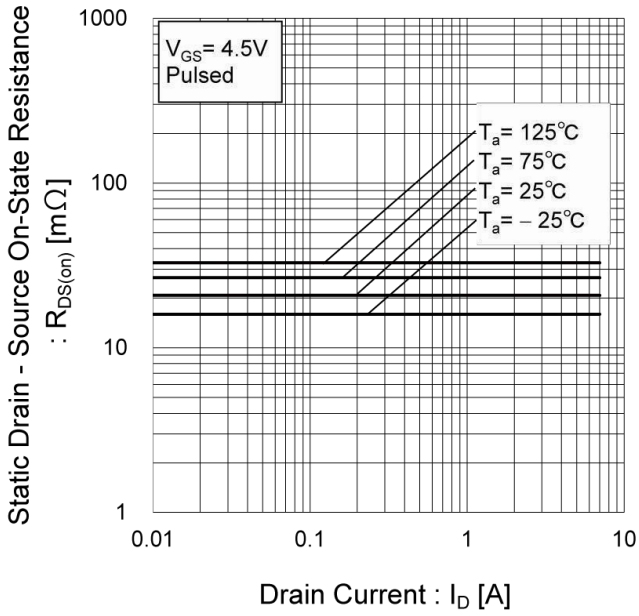


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(III)



Electrical characteristic curves
<Tr1>

Fig.15 Typical Capacitance vs. Drain - Source Voltage

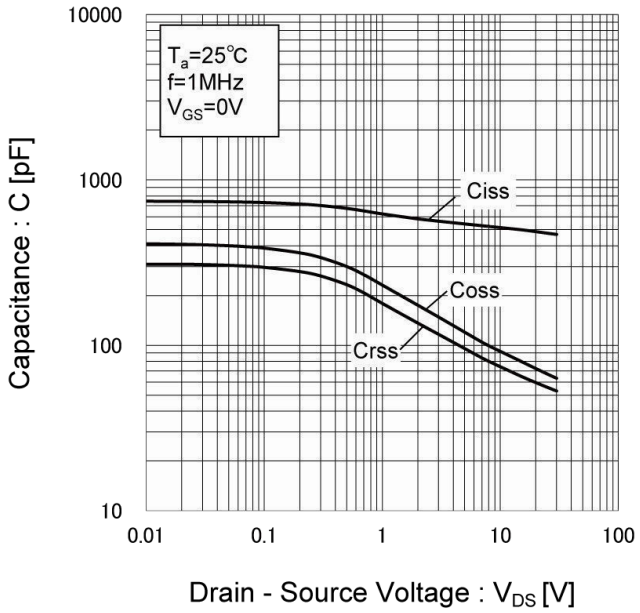


Fig.16 Switching Characteristics

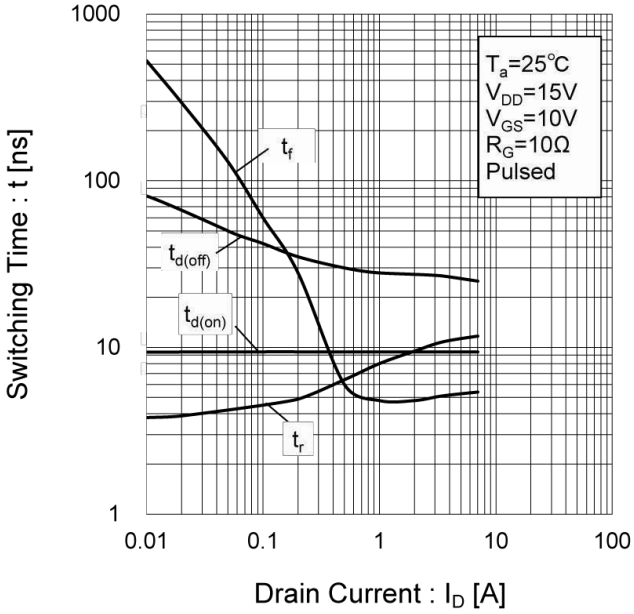


Fig.17 Dynamic Input Characteristics

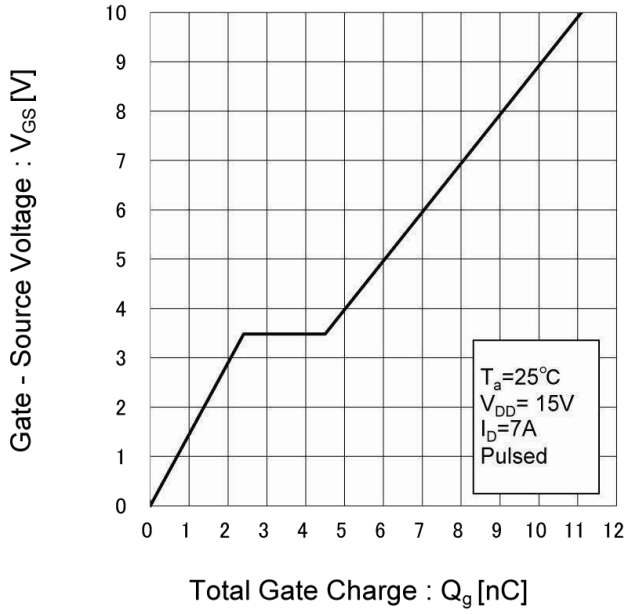
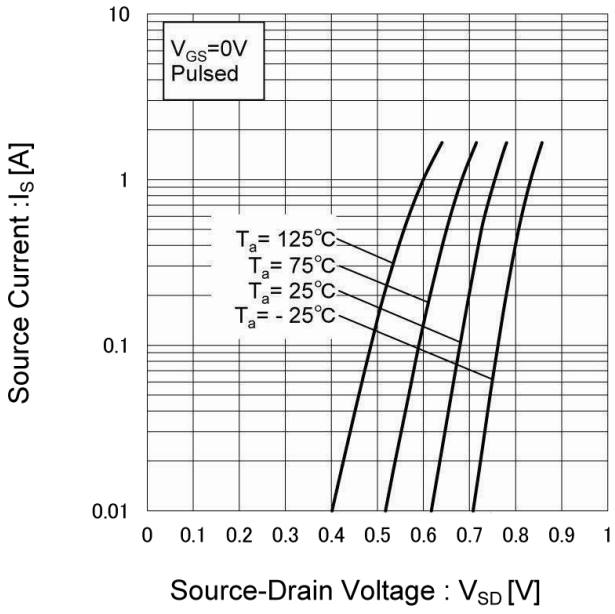


Fig.18 Source Current vs. Source Drain Voltage



Electrical characteristic curves
<Tr2>

Fig.1 Power Dissipation Derating Curve

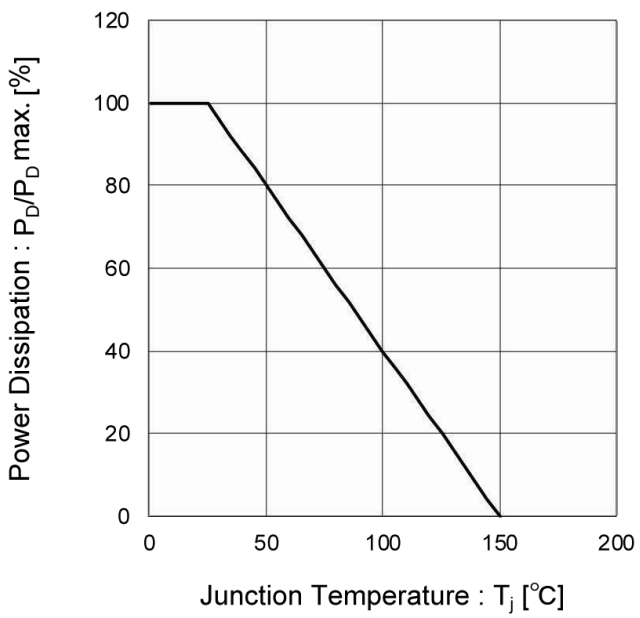
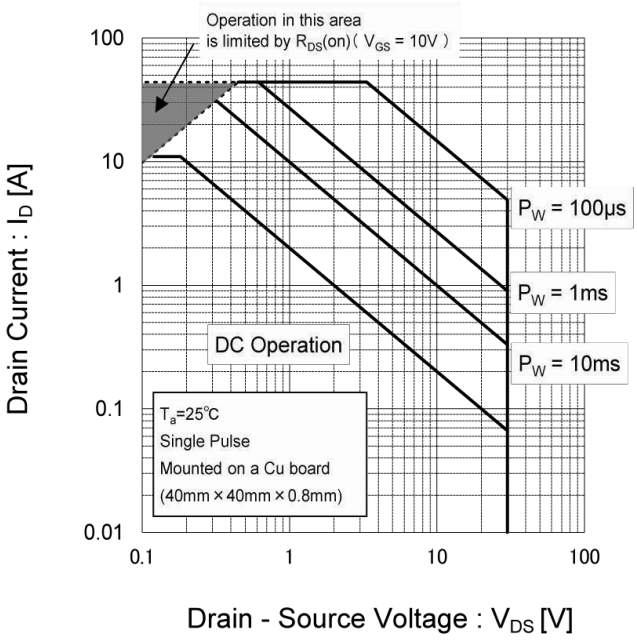


Fig.2 Maximum Safe Operating Area



Electrical characteristic curves
<Tr2>

Fig.3 Typical Output Characteristics(I)

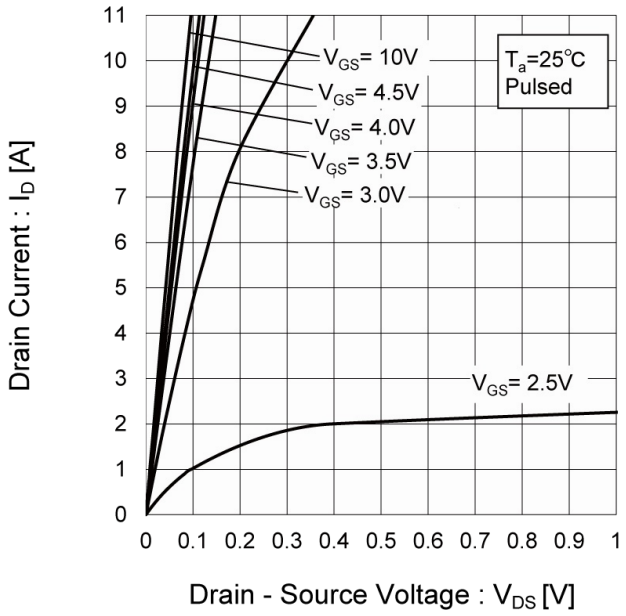


Fig.4 Typical Output Characteristics(II)

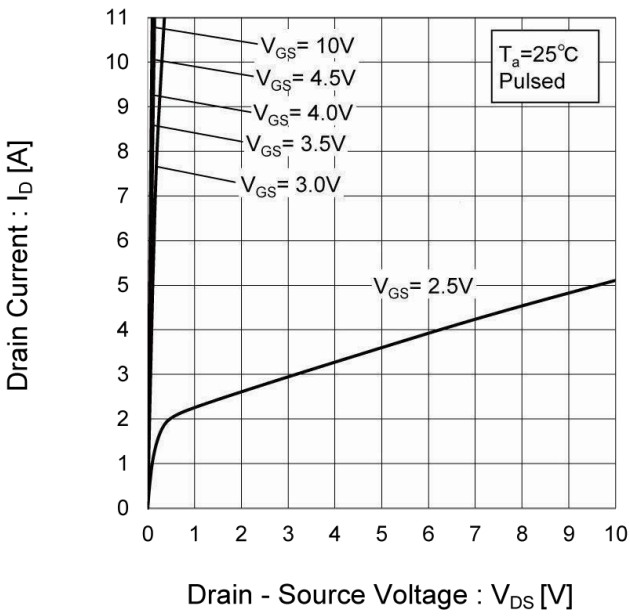


Fig.5 Breakdown Voltage vs. Junction Temperature

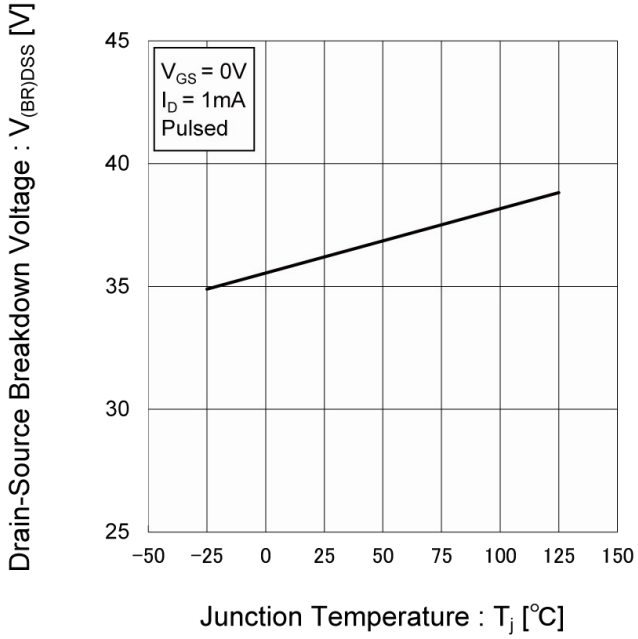
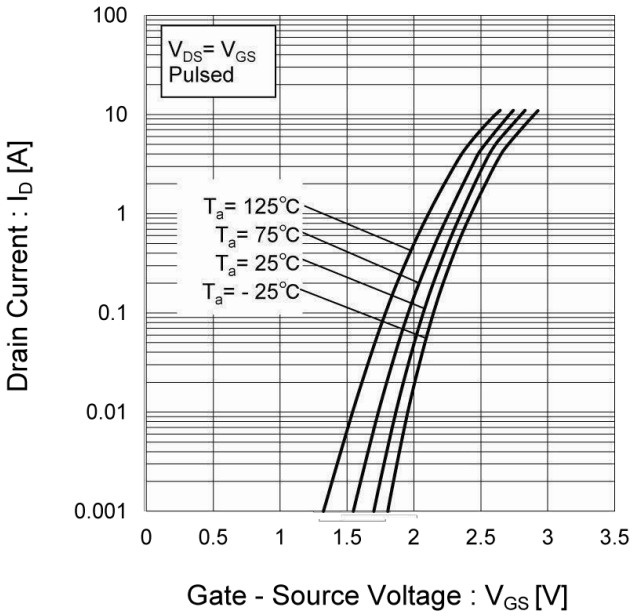


Fig.6 Typical Transfer Characteristics



Electrical characteristic curves
<Tr2>

Fig.7 Gate Threshold Voltage vs. Junction Temperature

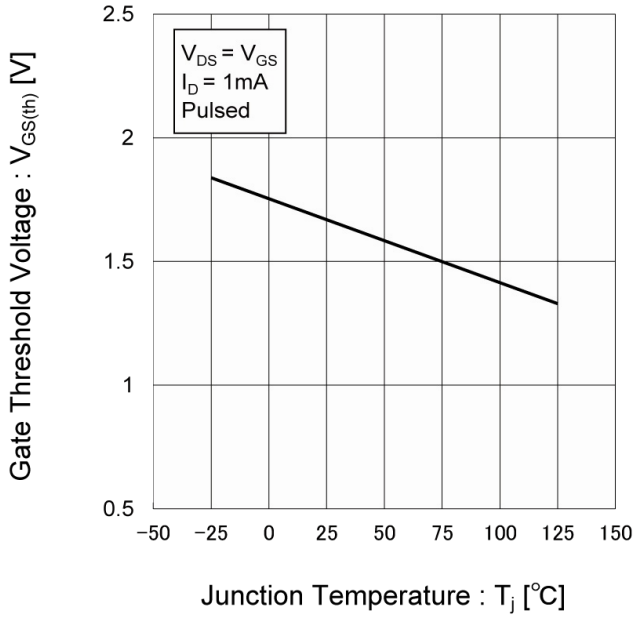


Fig.8 Forward Transfer Admittance vs. Drain Current

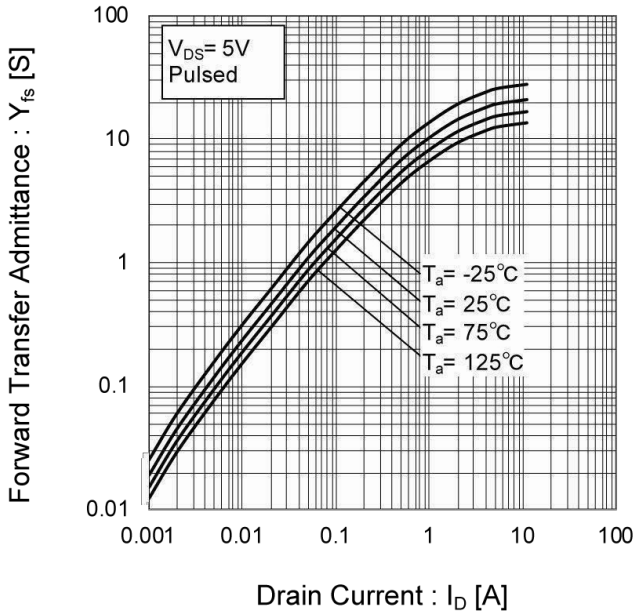


Fig.9 Drain Current Derating Curve

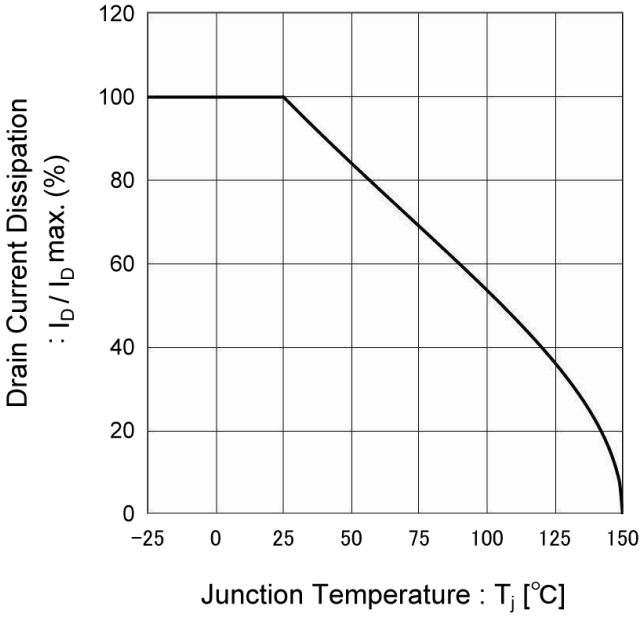
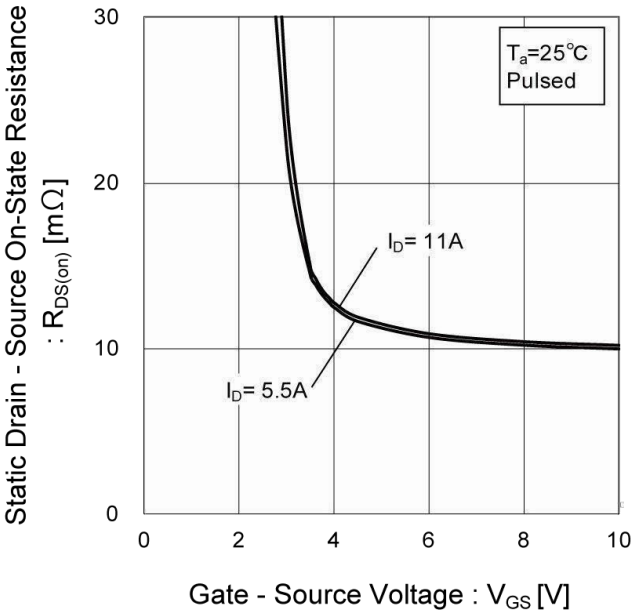


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



Electrical characteristic curves
<Tr2>

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

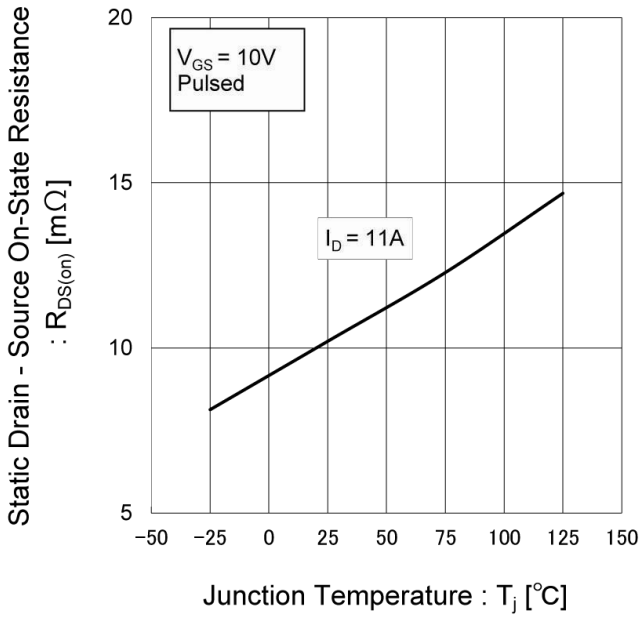


Fig.12 Static Drain - Source On - State Resistance vs. Drain Current(I)

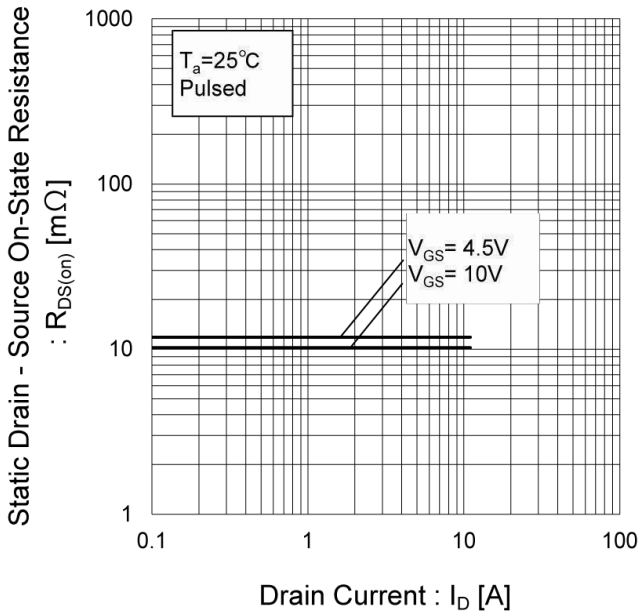


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(II)

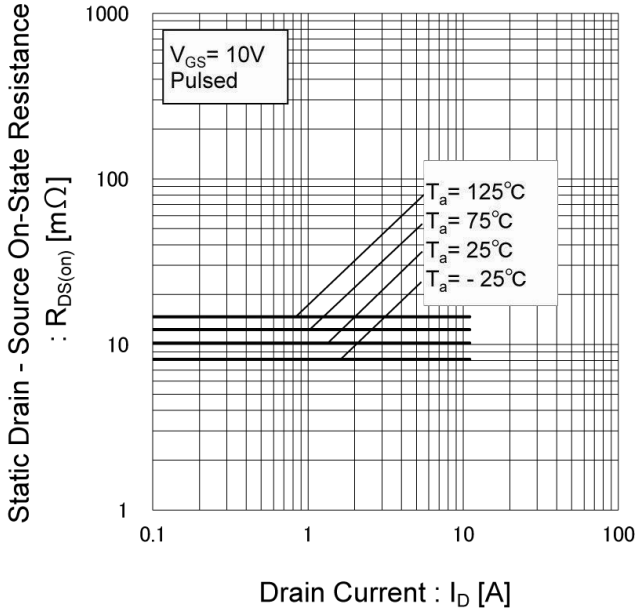
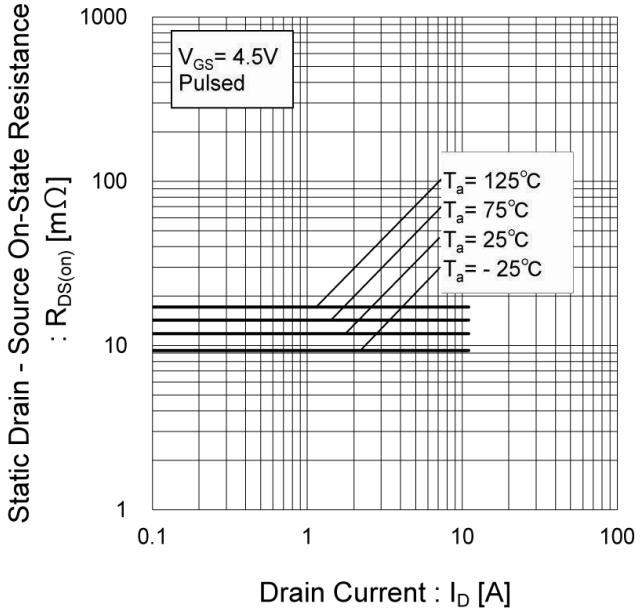


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(III)



Electrical characteristic curves
<Tr2>

Fig.15 Typical Capacitance vs. Drain - Source Voltage

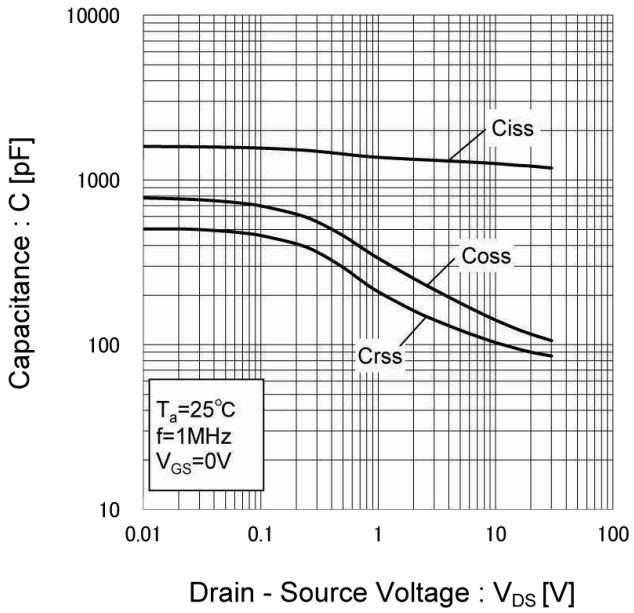


Fig.16 Switching Characteristics

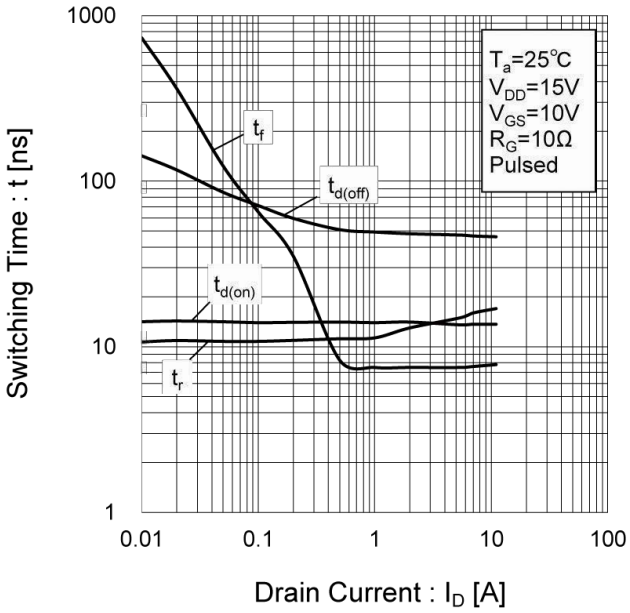


Fig.17 Dynamic Input Characteristics

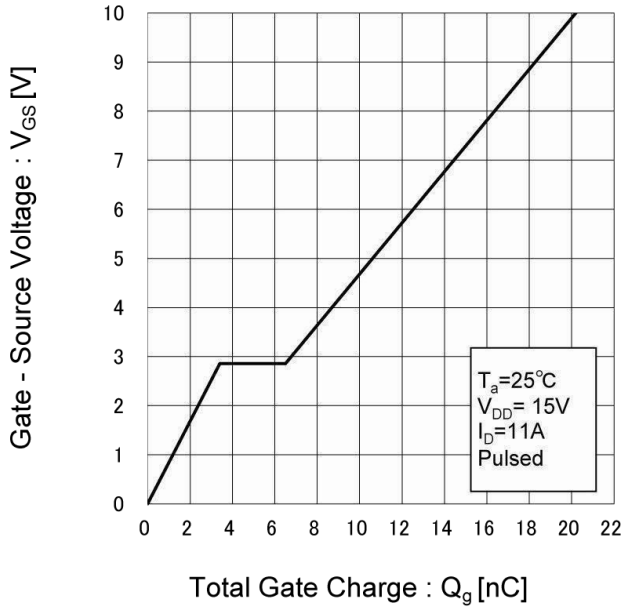
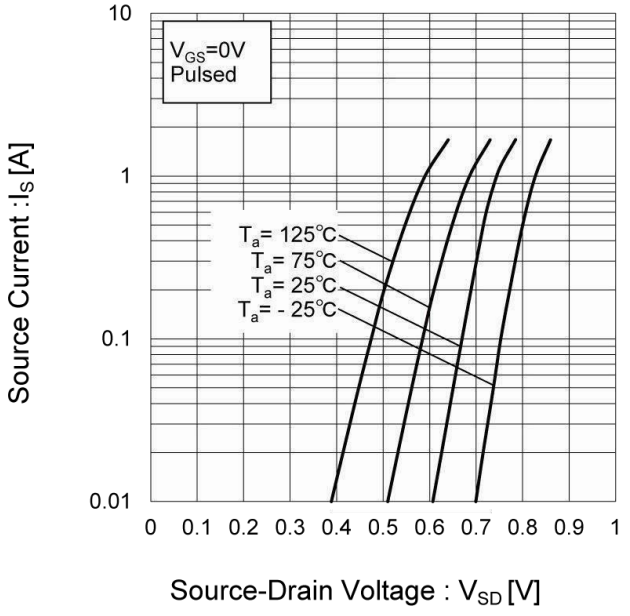


Fig.18 Source Current vs. Source Drain Voltage



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

Fig.1-1 Switching Time Measurement Circuit

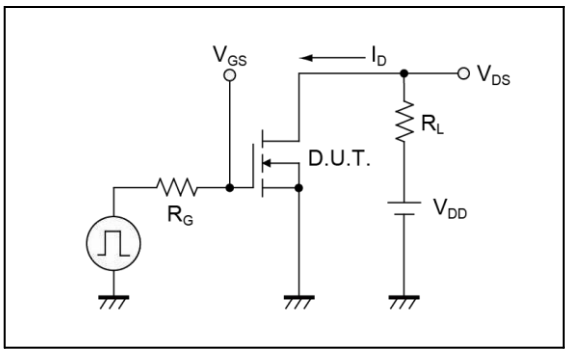


Fig.1-2 Switching Waveforms

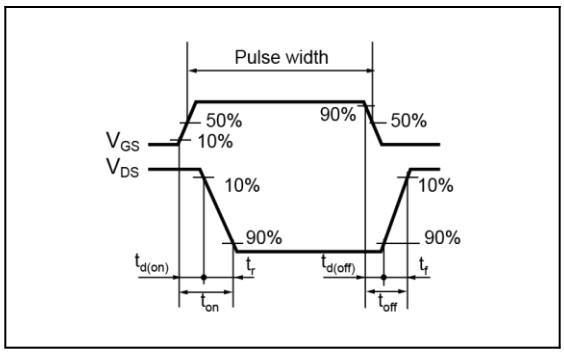


Fig.2-1 Gate Charge Measurement Circuit

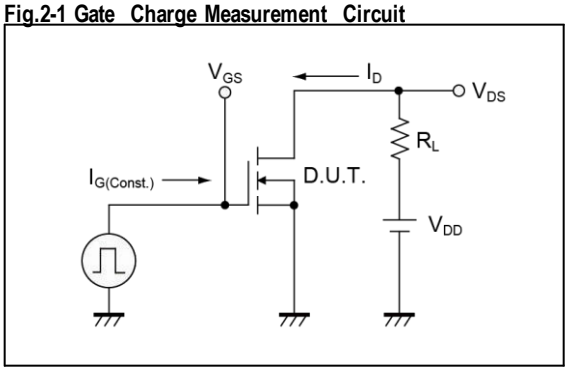


Fig.2-2 Gate Charge Waveform

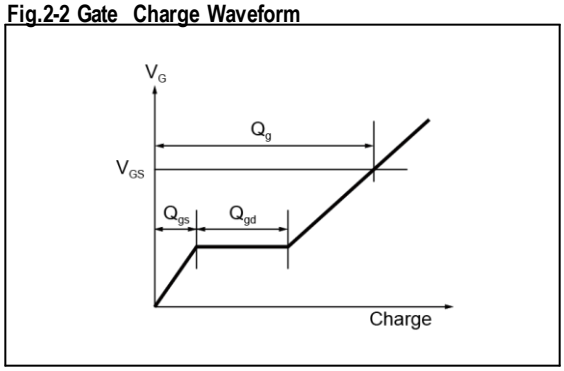


Fig.3-1 Avalanche Measurement Circuit

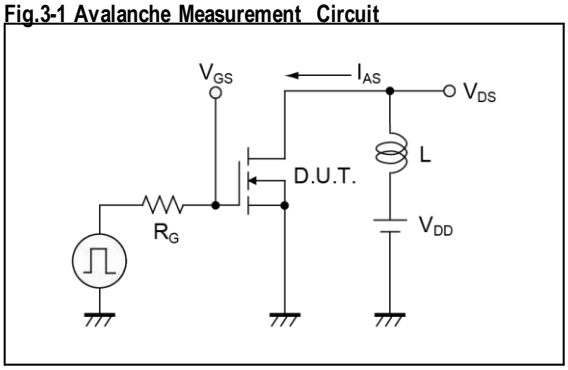
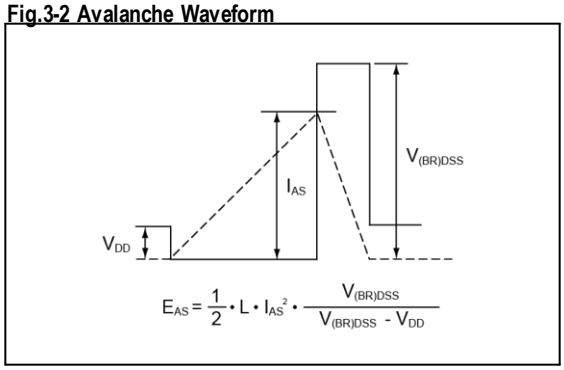


Fig.3-2 Avalanche Waveform



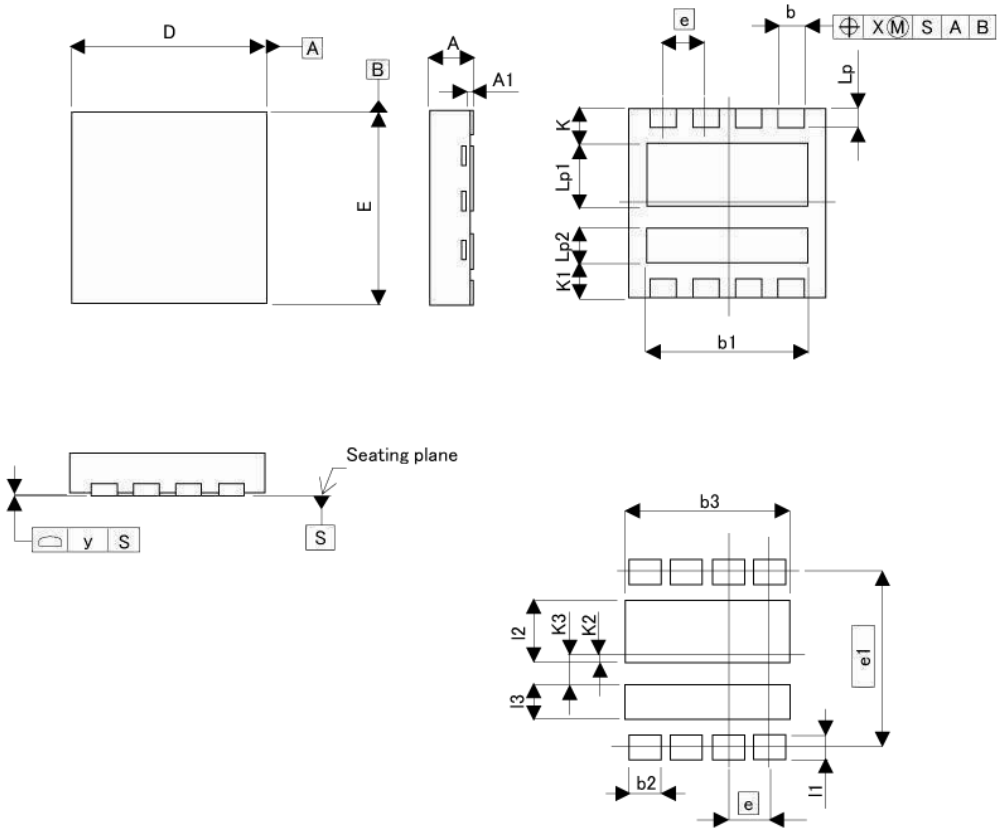
Notice:

1.Reconmonded RG(up) will be 47ohm to 68ohm in Fig 1-1 when MOS is used in Wireless power transmitter.

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

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	0.27	0.37	0.011	0.015
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	-	0.47	-	0.019
l2	-	1.09	-	0.043
l3	-	0.62	-	0.024
K2	-	0.21	-	0.008
K3	-	0.56	-	0.022

Dimension in mm/inches