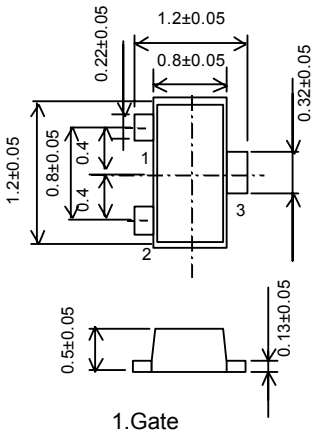
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type

SSM3K04FV

High Speed Switching Applications

- With built-in gate-source resistor: R_{GS} = 1 MΩ (typ.)
- 2.5 V gate drive
- High input impedance
- Low gate threshold voltage: V_{th} = 0.7~1.3 V
- Optimum for high-density mounting in small packages

Unit: mm



1.Gate
2.Source
3.Drain

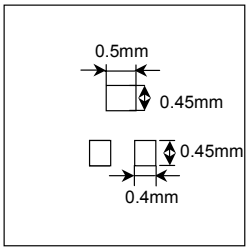
JEDEC	—
JEITA	—
TOSHIBA	2-2L1B

Weight: 1.5 mg (typ.)

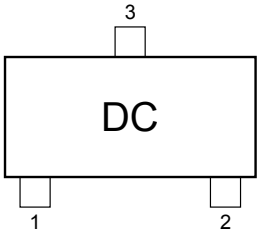
Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DS}	20	V
Gate-source voltage	V_{GSS}	10	V
DC drain current	I_D	100	mA
Drain power dissipation (Ta = 25°C)	P_D (Note)	150	mW
Channel temperature	T_{ch}	150	°C
Storage temperature range	T_{stg}	−55~150	°C

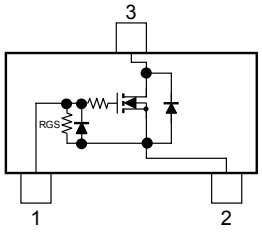
Note: Total rating, mounted on FR4 board



Marking



Equivalent Circuit

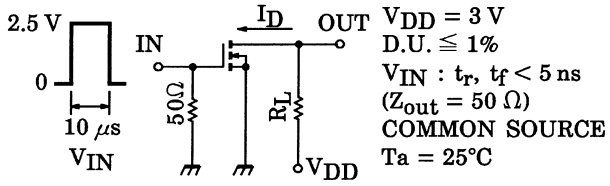


Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = 10 V, V_{DS} = 0	—	—	15	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 100 μA, V_{GS} = 0	20	—	—	V
Drain cut-off current		I_{DSS}	V_{DS} = 20 V, V_{GS} = 0	—	—	1	μA
Gate threshold voltage		V_{th}	V_{DS} = 3 V, I_D = 0.1 mA	0.7	—	1.3	V
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 3 V, I_D = 10 mA	25	50	—	mS
Drain-source on-resistance		$R_{DS\ (ON)}$	I_D = 10 mA, V_{GS} = 2.5 V	—	4	12	Ω
Input capacitance		C_{iss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	11.0	—	pF
Reverse transfer capacitance		C_{rss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	3.3	—	pF
Output capacitance		C_{oss}	V_{DS} = 3 V, V_{GS} = 0, f = 1 MHz	—	9.3	—	pF
Switching time	Turn-on time	t_{on}	V_{DD} = 3 V, I_D = 10 mA, V_{GS} = 0~2.5 V	—	0.16	—	μs
	Turn-off time	t_{off}	V_{DD} = 3 V, I_D = 10 mA, V_{GS} = 0~2.5 V	—	0.19	—	
Gate-source resistor		R_{GS}	V_{GS} = 0~10 V	0.7	1.0	1.3	MΩ

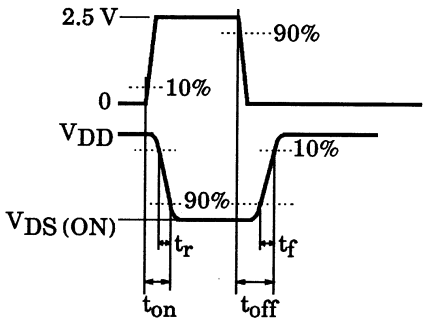
Switching Time Test Circuit

(a) Test circuit



(b) V_{IN}
V_{GS}

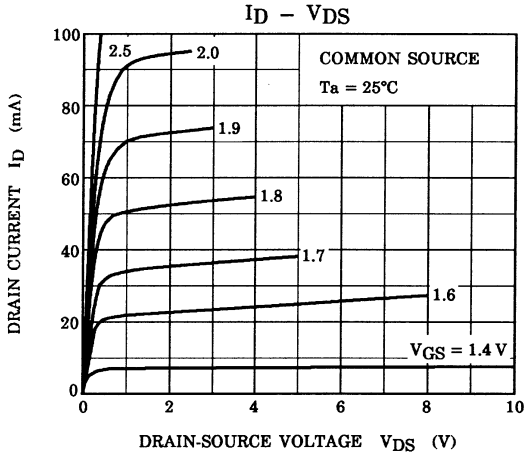
(c) V_{OUT}
V_{DS}



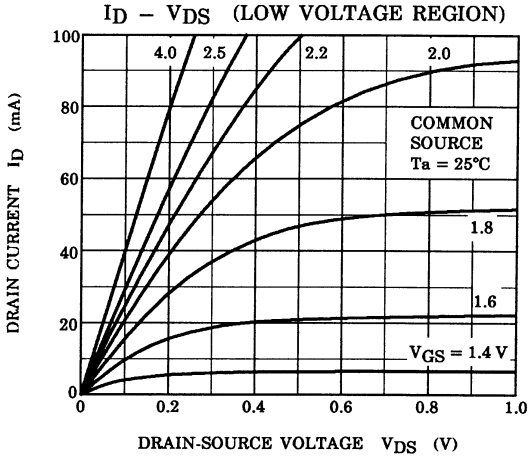
Precaution

V_{th} can be expressed as the voltage between gate and source when the low operating current value is I_D = 100 μA for this product. For normal switching operation, $V_{GS\ (on)}$ requires a higher voltage than V_{th} and $V_{GS\ (off)}$ requires a lower voltage than V_{th}.
(The relationship can be established as follows: $V_{GS\ (off)} < V_{th} < V_{GS\ (on)}$)
Take this into consideration when using the device. The V_{GS} recommended voltage for turning on this product is 2.5 V or higher.

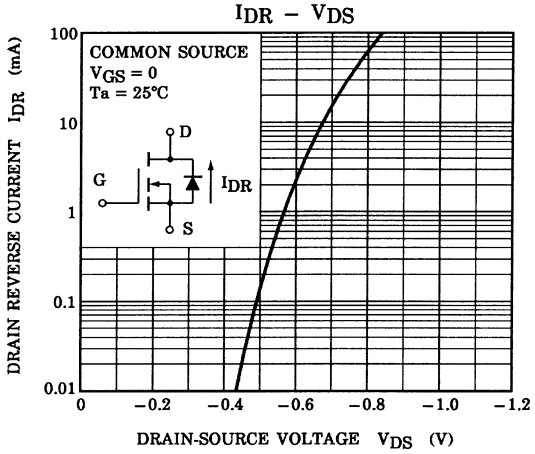
I_D – V_{DS}



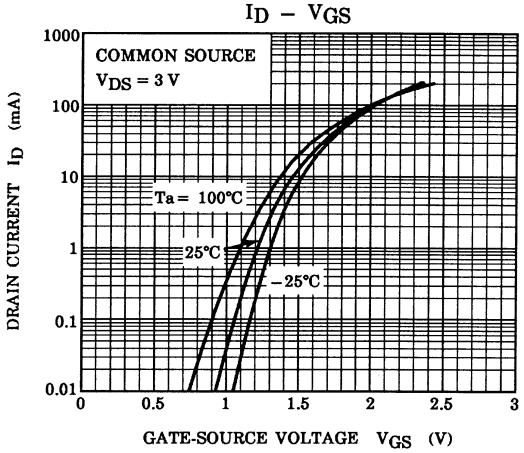
I_D – V_{DS} (LOW VOLTAGE REGION)



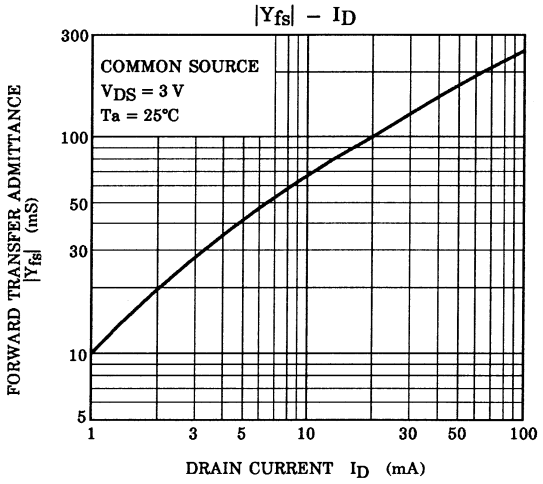
I_{DR} – V_{DS}



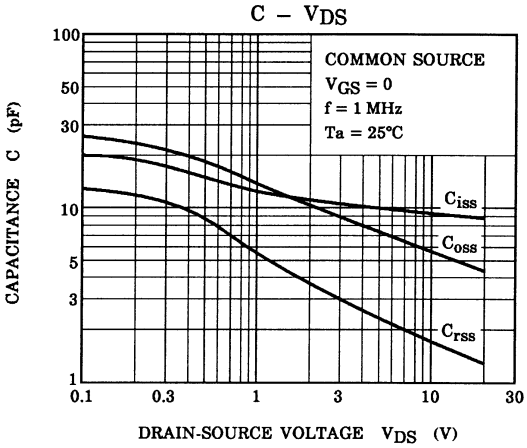
I_D – V_{GS}



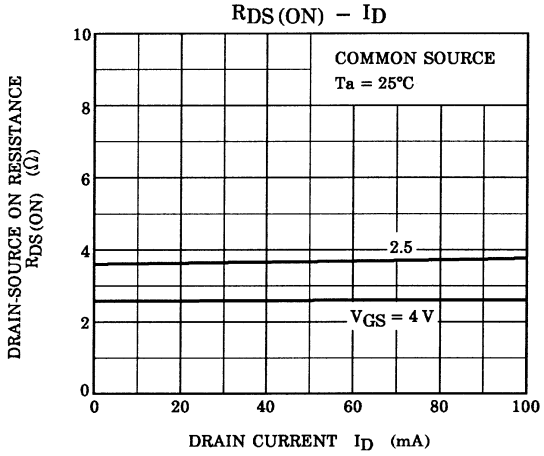
$|Y_{fs}|$ – I_D



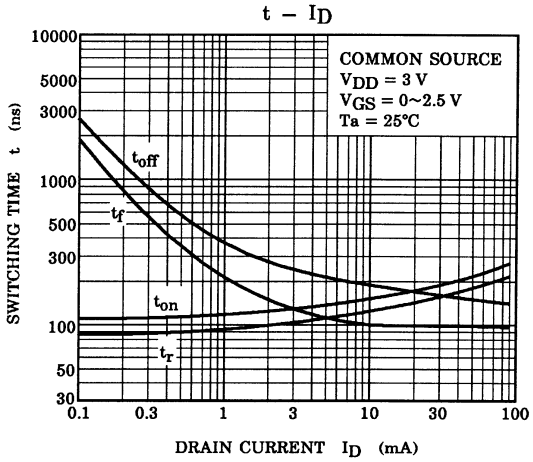
C – V_{DS}



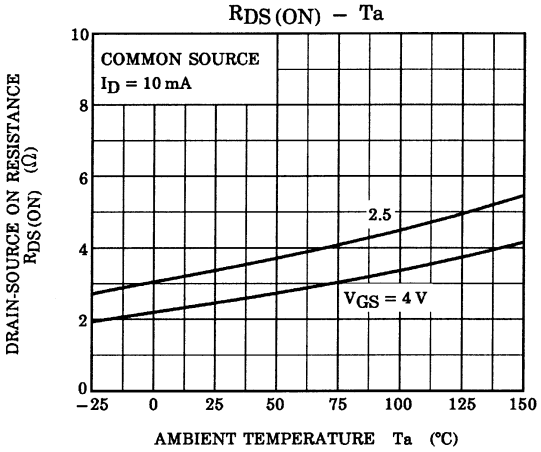
$R_{DS\,(ON)}$ – I_D



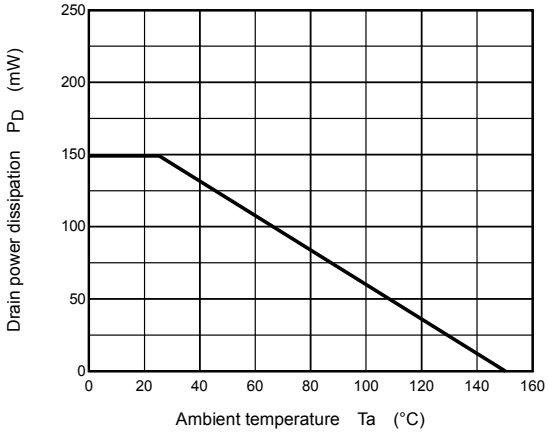
t – I_D



$R_{DS\,(ON)}$ – Ta



P_D – Ta



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