

TOSHIBA Field-Effect Transistor Silicon N-Channel MOS Type

SSM3K35FS

- High-Speed Switching Applications
- Analog Switch Applications

- 1.2-V drive
- Low ON-resistance: $R_{ON} = 20\ \Omega$ (max) (@ $V_{GS} = 1.2\text{ V}$)
 $R_{ON} = 8\ \Omega$ (max) (@ $V_{GS} = 1.5\text{ V}$)
 $R_{ON} = 4\ \Omega$ (max) (@ $V_{GS} = 2.5\text{ V}$)
 $R_{ON} = 3\ \Omega$ (max) (@ $V_{GS} = 4.0\text{ V}$)

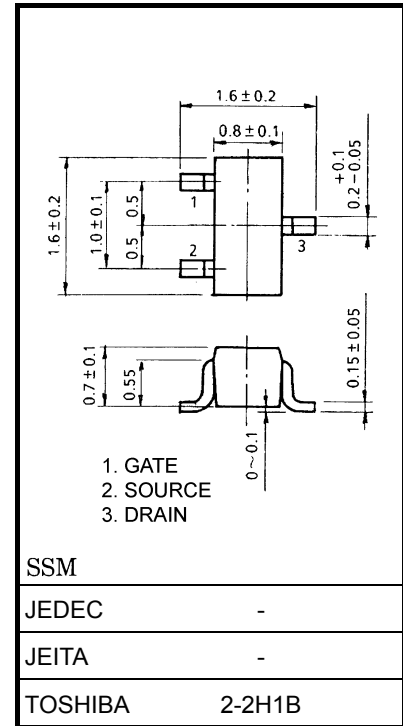
Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	20	V
Gate-source voltage		V_{GSS}	± 10	V
Drain current	DC	I_D	180	mA
	Pulse	I_{DP}	360	
Drain power dissipation		P_D	100	mW
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature		T_{stg}	-55 to 150	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

Unit: mm



Weight: 2.4 mg (typ.)

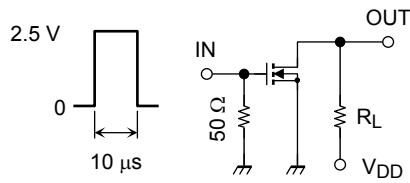
Electrical Characteristics ($T_a = 25^\circ\text{C}$)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 0.1\text{ mA}, V_{GS} = 0\text{ V}$	20	—	—	V
Drain cutoff current		I_{DSS}	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	—	—	1	μA
Gate threshold voltage		V_{th}	$V_{DS} = 3\text{ V}, I_D = 1\text{ mA}$	0.4	—	1.0	V
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 3\text{ V}, I_D = 50\text{ mA}$ (Note 1)	115	—	—	mS
Drain-source ON-resistance		$R_{DS(ON)}$	$I_D = 50\text{ mA}, V_{GS} = 4\text{ V}$ (Note 1)	—	1.5	3	Ω
			$I_D = 50\text{ mA}, V_{GS} = 2.5\text{ V}$ (Note 1)	—	2	4	
			$I_D = 5\text{ mA}, V_{GS} = 1.5\text{ V}$ (Note 1)	—	3	8	
			$I_D = 5\text{ mA}, V_{GS} = 1.2\text{ V}$ (Note 1)	—	5	20	
Input capacitance		C_{iss}	$V_{DS} = 3\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	9.5	—	pF
Reverse transfer capacitance		C_{rss}		—	4.1	—	
Output capacitance		C_{oss}		—	9.5	—	
Switching time	Turn-on time	t_{on}	$V_{DD} = 3\text{ V}, I_D = 50\text{ mA}, V_{GS} = 0\text{ to }2.5\text{ V}$	—	115	—	ns
	Turn-off time	t_{off}		—	300	—	
Drain-source forward voltage		V_{DSF}	$I_D = -180\text{ mA}, V_{GS} = 0\text{ V}$ (Note 1)	—	-0.9	-1.2	V

Note 1: Pulse test

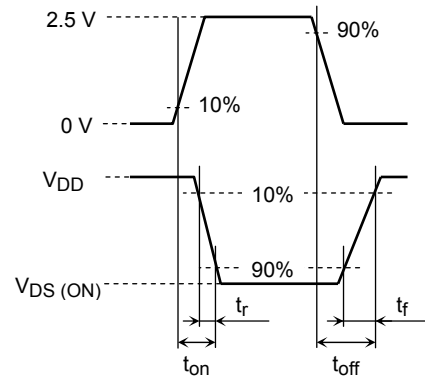
Switching Time Test Circuit

(a) Test Circuit



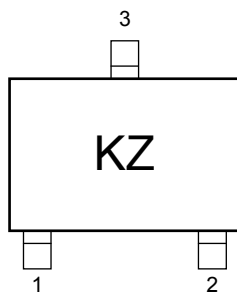
$V_{DD} = 3\text{ V}$
D.U. $\leq 1\%$
 V_{IN} : $t_r, t_f < 5\text{ ns}$
($Z_{out} = 50\ \Omega$)
Common Source
 $T_a = 25^\circ\text{C}$

(b) V_{IN}

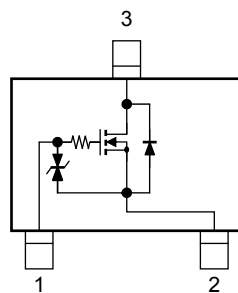


(c) V_{OUT}

Marking



Equivalent Circuit (top view)

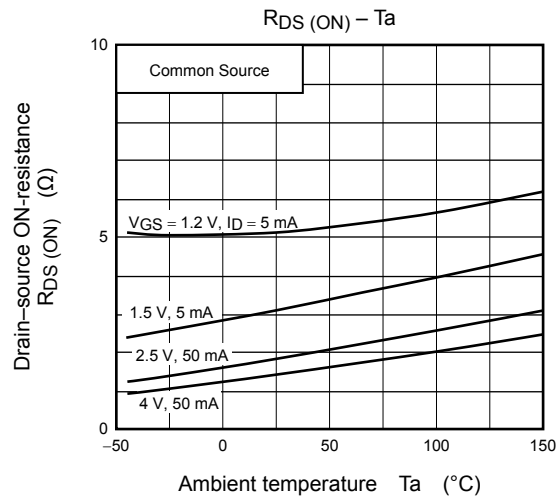
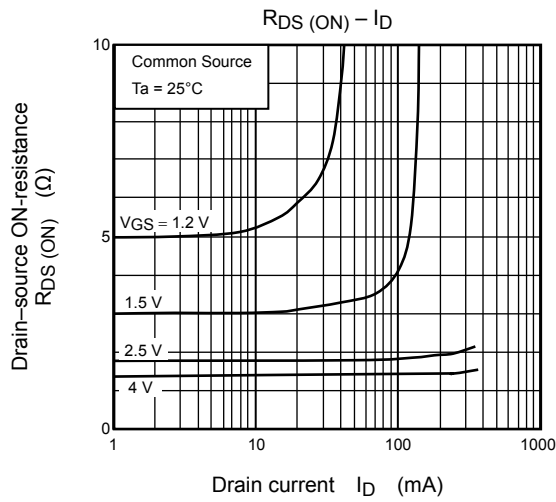
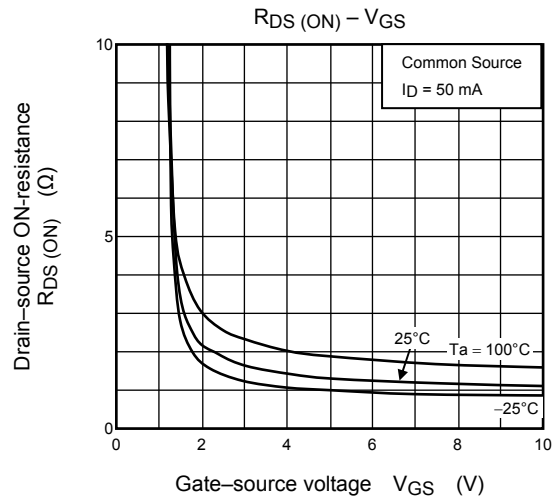
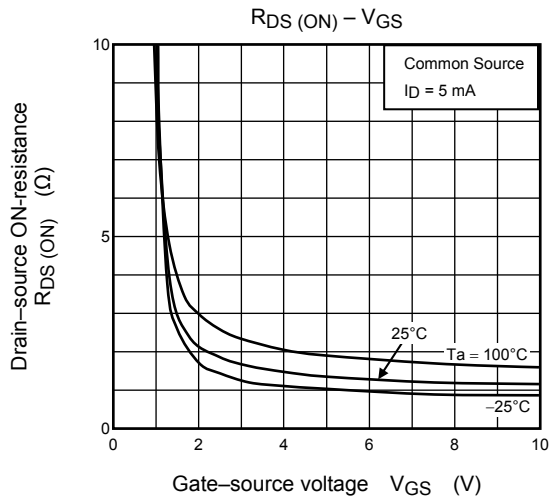
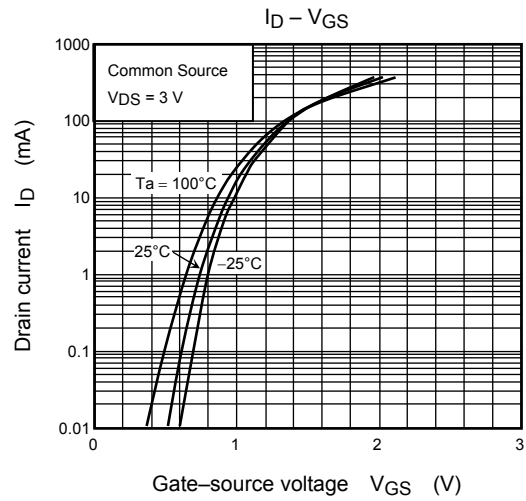
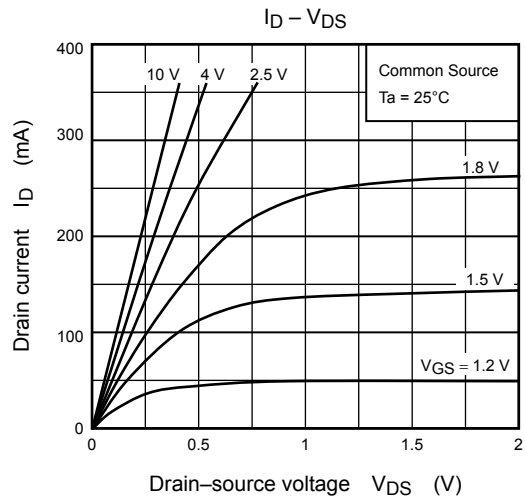


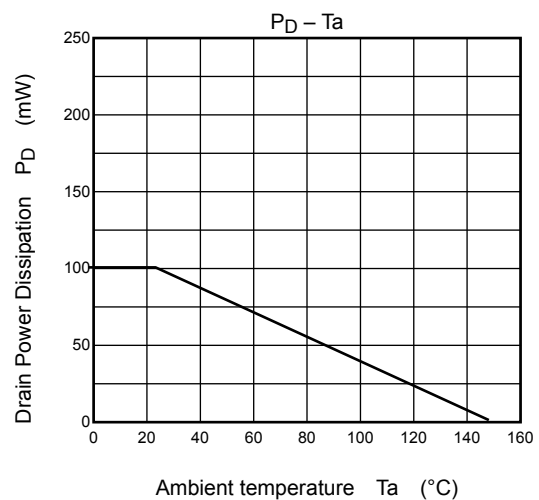
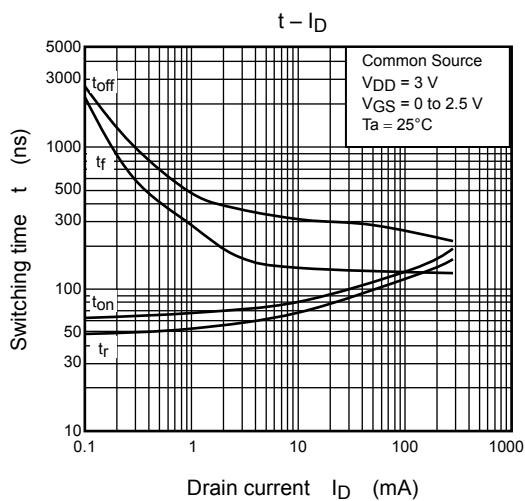
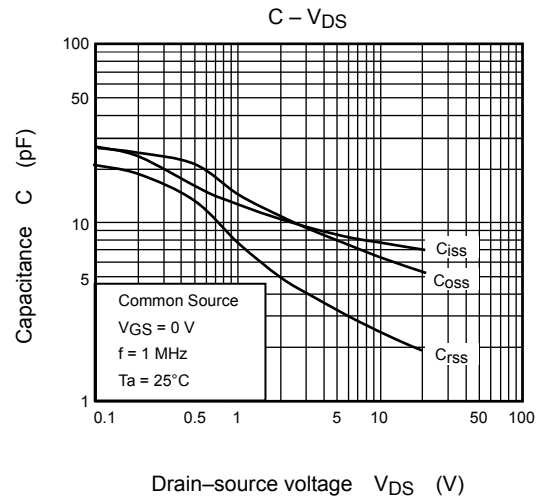
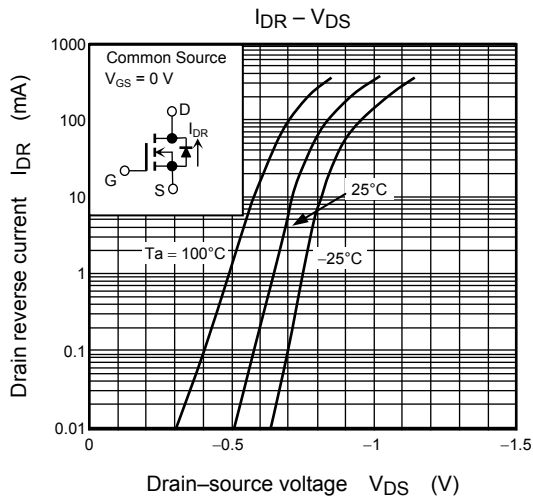
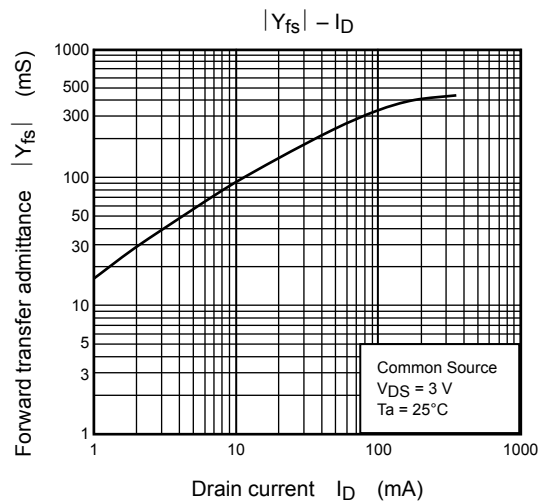
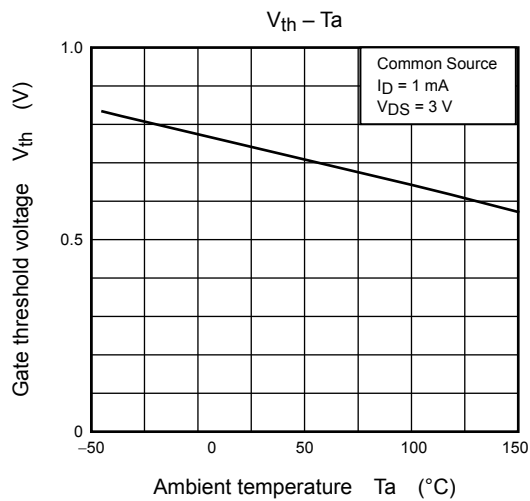
Usage Considerations

Let V_{th} be the voltage applied between gate and source that causes the drain current (I_D) to be below (1 mA for the SSM3K35FS). Then, for normal switching operation, $V_{GS(on)}$ must be higher than V_{th} , and $V_{GS(off)}$ must be lower than V_{th} . This relationship can be expressed as: $V_{GS(off)} < V_{th} < V_{GS(on)}$. Take this into consideration when using the device.

Handling Precaution

When handling individual devices (which are not yet mounting on a circuit board), be sure that the environment is protected against electrostatic electricity. Operators should wear anti-static clothing, and containers and other objects that come into direct contact with devices should be made of anti-static materials.





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