

TOSHIBA Field Effect Transistor Silicon N Channel Junction Type

# 2SK4059MFV

For ECM

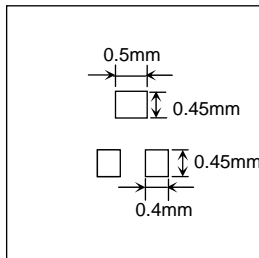
- Application for compact ECM

## Absolute Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Gate-Drain voltage	V <sub>GDO</sub>	-20	V
Gate Current	I <sub>G</sub>	10	mA
Drain power dissipation (Ta = 25°C)	P <sub>D</sub> (Note 1)	150	mW
Junction Temperature	T <sub>j</sub>	125	°C
Storage temperature range	T <sub>stg</sub>	-55~125	°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).

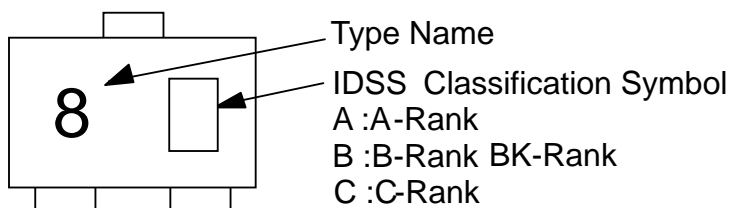
Note 1: Mounted on FR4 board



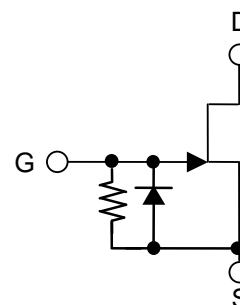
## IDSS CLASSIFICATION

A-Rank	140~240µA
B-Rank	210~350µA
BK-Rank	210~400µA
C-Rank	320~500µA

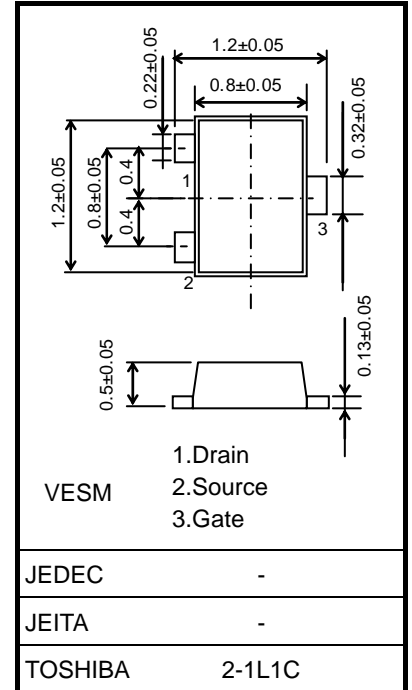
## Marking



## Equivalent Circuit



Unit: mm



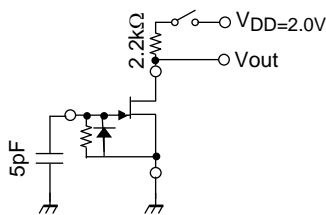
Weight: 1.5mg (typ.)

## Electrical Characteristics (Ta=25°C)

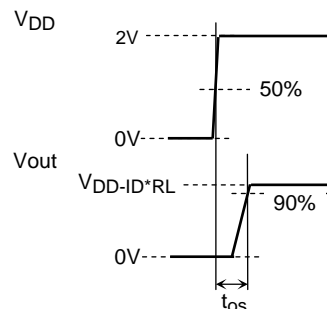
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 0	A	140	—	240	μA
			B	210	—	350	
			BK	210	—	400	
			C	320	—	500	
Drain Current	I <sub>D</sub>	V <sub>DD</sub> = 2 V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF	A	125	—	260	μA
			B	190	—	370	
			BK	190	—	420	
			C	290	—	500	
Gate-Source Cut-off Voltage	V <sub>GS(OFF)</sub>	V <sub>DS</sub> = 2 V, I <sub>D</sub> = 1μA	-0.1	—	-1.0	V	
Forward transfer admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 0V	1.35	1.85	—	mS	
Gate-Drain Voltage	V <sub>(BR)GDO</sub>	I <sub>G</sub> = -10μA	-20	—	—	V	
Input capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 2 V, V <sub>GS</sub> = 0, f = 1 MHz	—	4.0	—	pF	
Voltage Gain	G <sub>v</sub>	V <sub>DD</sub> = 2V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF, f = 1kHz, v <sub>in</sub> = 100mV	A	-1.2	+0.9	—	dB
			B	-0.2	+1.4	—	
			BK	-0.2	+1.7	—	
			C	+0.5	+1.8	—	
Delta Voltage Gain	DG <sub>v(f)</sub>	V <sub>DD</sub> = 2V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF, f = 1kHz~100Hz, v <sub>in</sub> = 100mV	—	0	-1	dB	
Delta Voltage Gain	DG <sub>v(V)</sub>	V <sub>DD</sub> = 2V~1.5V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF, f = 1kHz, v <sub>in</sub> = 100mV	A	—	-0.6	-1.1	dB
			B	—	-0.8	-1.7	
			BK	—	-1.1	-2.0	
			C	—	-1.4	-3.2	
Noise Voltage	V <sub>N</sub>	V <sub>DD</sub> = 2V, R <sub>L</sub> = 1kΩ, C <sub>g</sub> = 10pF, G <sub>v</sub> = 80dB, A-Curve Filter	A	—	33	75	mV
			B	—	38	80	
			BK	—	40	85	
			C	—	42	90	
Total Harmonic Distortion	THD	V <sub>DD</sub> = 2V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF, f = 1kHz, v <sub>in</sub> = 50mV	A	—	1.3	—	%
			B	—	0.6	—	
			BK	—	0.5	—	
			C	—	0.1	—	
Time Output Stability	t <sub>os</sub>	V <sub>DD</sub> = 2V, R <sub>L</sub> = 2.2kΩ, C <sub>g</sub> = 5pF	—	100	200	ms	

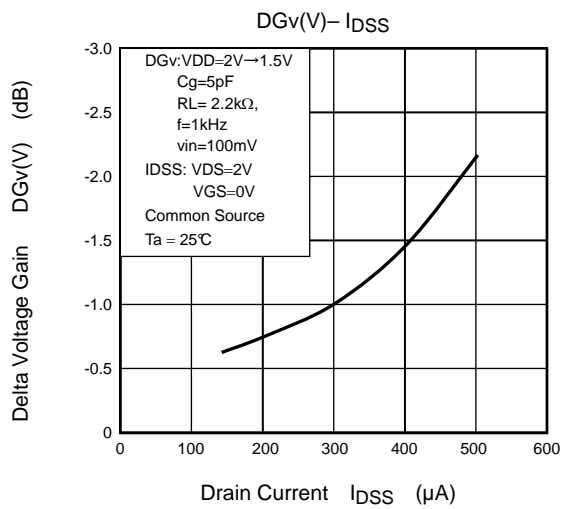
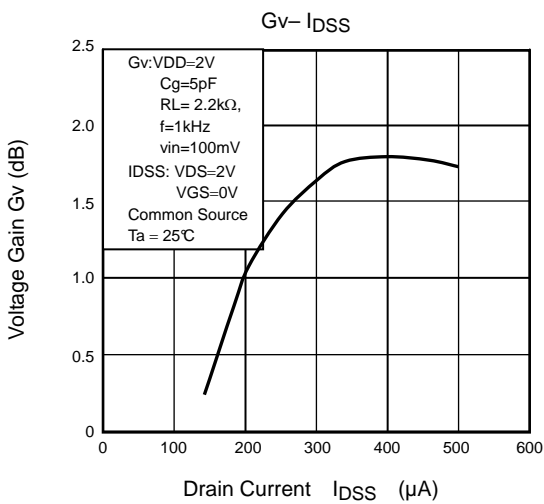
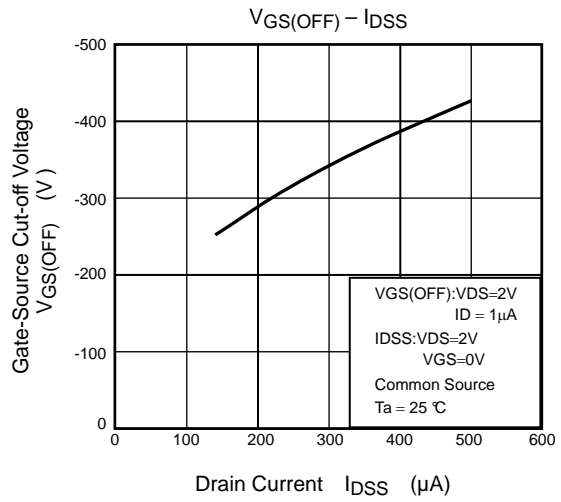
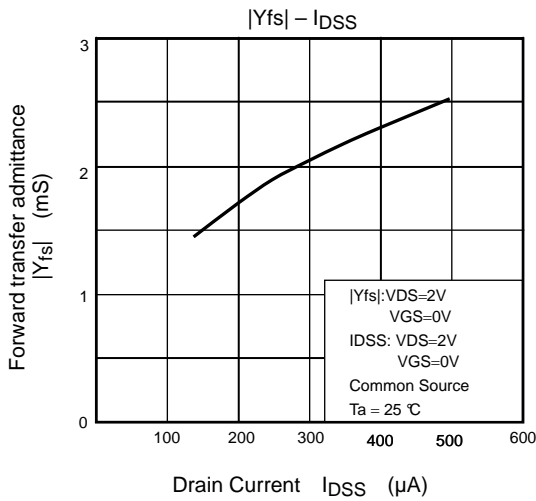
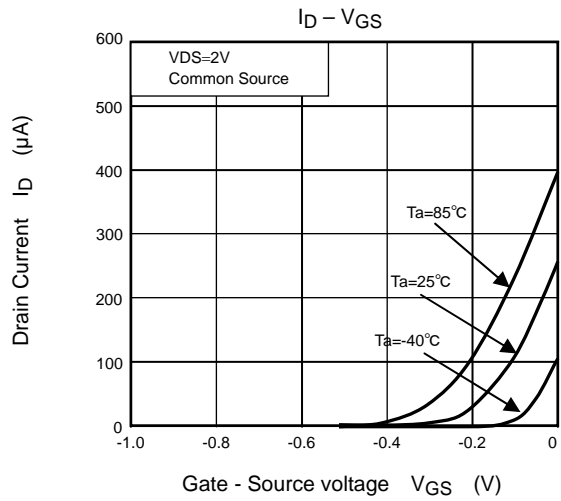
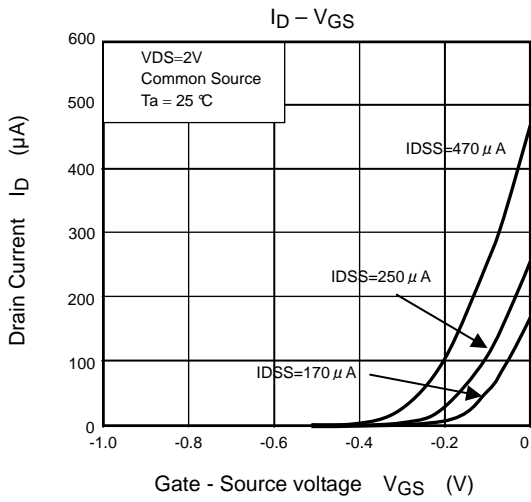
### Time Output Stability Test Method

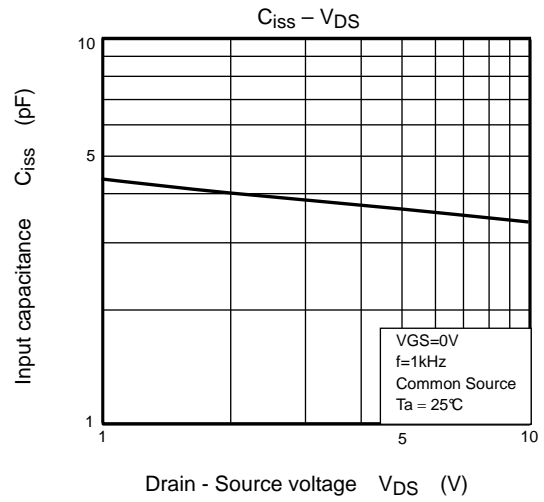
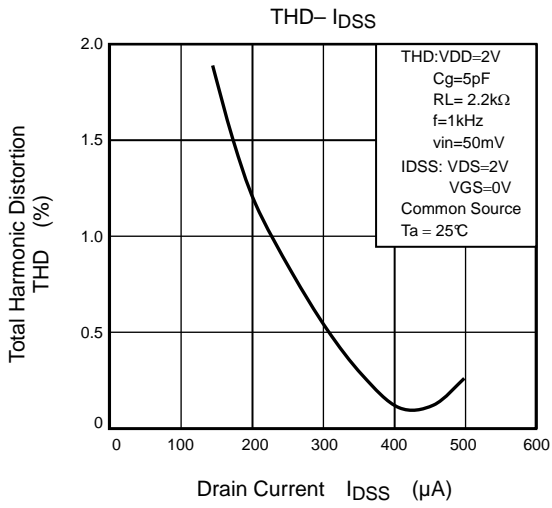
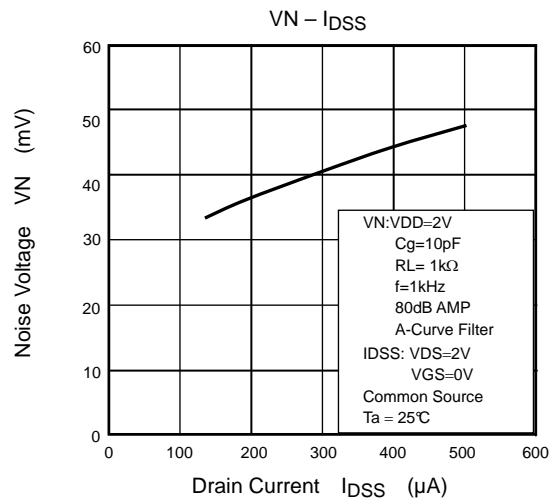
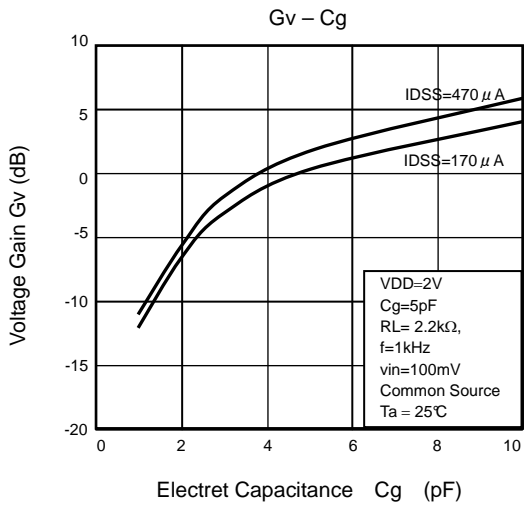
#### a) TEST CIRCUIT



#### b) TEST SIGNAL







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