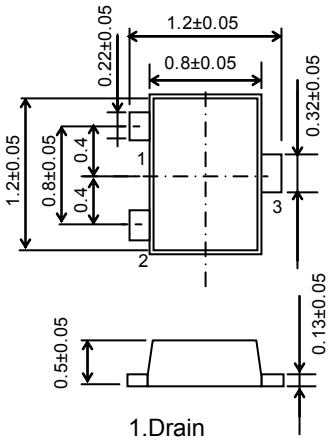
TOSHIBA Field Effect Transistor Silicon N Channel Junction Type

2SK3376MFV

For ECM

- Application for Ultra-compact ECM

Unit: mm



1.Drain
2.Source
3.Gate

JEDEC	-
JEITA	-
TOSHIBA	2-1L1C

VESM

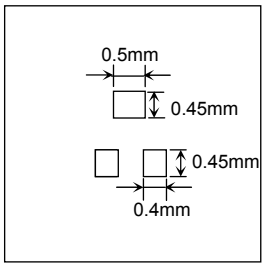
Weight: 1.5mg (typ.)

Absolute Maximum Ratings (Ta=25°C)

Characteristic	Symbol	Rating	Unit
Gate-Drain voltage	V_{GDO}	-20	V
Gate Current	I_G	10	mA
Drain power dissipation (Ta = 25°C)	P_D (Note 1)	150	mW
Junction Temperature	T_j	125	°C
Storage temperature range	T_{stg}	−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).

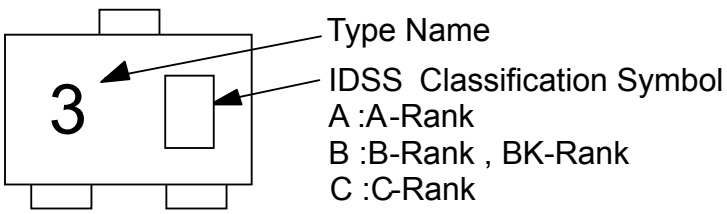
Note 1: Mounted on FR4 board



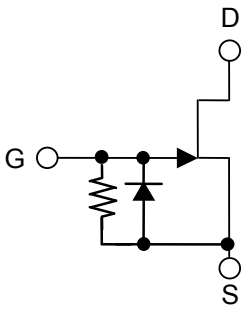
IDSS CLASSIFICATION

A-Rank	80 to 200μA
B-Rank	170 to 300μA
C-Rank	270 to 480μA
BK-Rank	150 to 350μA

Marking



Equivalent Circuit



Electrical Characteristics (A-Rank IDSS Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain Current	I_{DSS}	V_{DS} = 2 V, V_{GS} = 0	80	—	200	μA
Drain Current	I_D	V_{DD} = 2 V, RL= 2kΩ,Cg = 3pF	—	—	240	μA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	V_{DS} = 2 V, I_D = 1μA	-0.1	—	-0.8	V
Forward transfer admittance	$\|Y_{fs}\|$	V_{DS} = 2 V,V_{GS} = 0V	0.7	1.4	—	mS
Input capacitance	C_{iss}	V_{DS} = 2 V, V_{GS} = 0, f = 1 MHz	—	5.5	—	pF
Voltage Gain	Gv	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF, f = 1kHz	-13.5	—	-9.0	dB
Delta Voltage Gain	DGv(f)	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF,f = 1kHz to 100Hz	—	—	-2.0	dB
Delta Voltage Gain	DGv(V)	V_{DD} = 2V to 1V, RL= 2kΩ,Cg = 3pF,f = 1kHz	—	—	-4.0	dB
Noise Voltage	VN	V_{DD} = 2V, RL= 1kΩ,Cg = 3pF,Gv=80dB,f=A-Curve Filter	—	—	47	mV

Electrical Characteristics (B-Rank IDSS Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain Current	I_{DSS}	V_{DS} = 2 V, V_{GS} = 0	170	—	300	μA
Drain Current	I_D	V_{DD} = 2 V, RL= 2kΩ,Cg = 3pF	—	—	340	μA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	V_{DS} = 2 V, I_D = 1μA	-0.15	—	-1.0	V
Forward transfer admittance	$\|Y_{fs}\|$	V_{DS} = 2 V,V_{GS} = 0V	0.7	1.4	—	mS
Input capacitance	C_{iss}	V_{DS} = 2 V, V_{GS} = 0, f = 1 MHz	—	5.5	—	pF
Voltage Gain	Gv	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF, f = 1kHz	-11.5	—	-8.0	dB
Delta Voltage Gain	DGv(f)	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF,f = 1kHz to 100Hz	—	—	-2.0	dB
Delta Voltage Gain	DGv(V)	V_{DD} = 2V to 1V, RL= 2kΩ,Cg = 3pF,f = 1kHz	—	—	-7.0	dB
Noise Voltage	VN	V_{DD} = 2V, RL= 1kΩ,Cg = 3pF,Gv=80dB,f=A-Curve Filter	—	—	50	mV

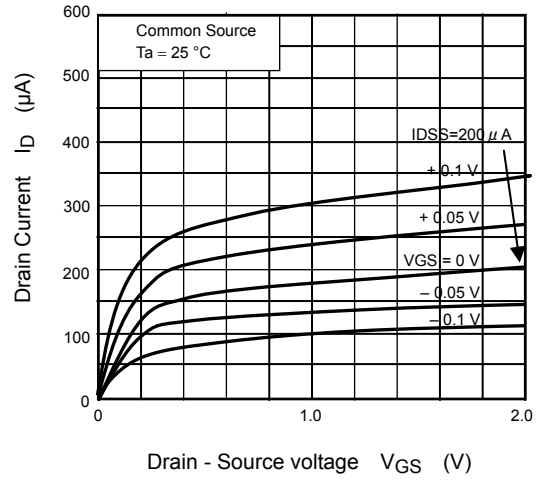
Electrical Characteristics (C-Rank IDSS Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain Current	I_{DSS}	V_{DS} = 2 V, V_{GS} = 0	270	—	480	μA
Drain Current	I_D	V_{DD} = 2 V, RL= 2kΩ,Cg = 3pF	—	—	520	μA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	V_{DS} = 2 V, I_D = 1μA	-0.2	—	-1.2	V
Forward transfer admittance	$\|Y_{fs}\|$	V_{DS} = 2 V,V_{GS} = 0V	0.7	1.4	—	mS
Input capacitance	C_{iss}	V_{DS} = 2 V, V_{GS} = 0, f = 1 MHz	—	5.5	—	pF
Voltage Gain	Gv	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF, f = 1kHz	-10.5	—	-6.75	dB
Delta Voltage Gain	DGv(f)	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF,f = 1kHz to 100Hz	—	—	-2.0	dB
Delta Voltage Gain	DGv(V)	V_{DD} = 2V to 1V, RL= 2kΩ,Cg = 3pF,f = 1kHz	—	—	-20	dB
Noise Voltage	VN	V_{DD} = 2V, RL= 1kΩ,Cg = 3pF,Gv=80dB,f=A-Curve Filter	—	—	75	mV

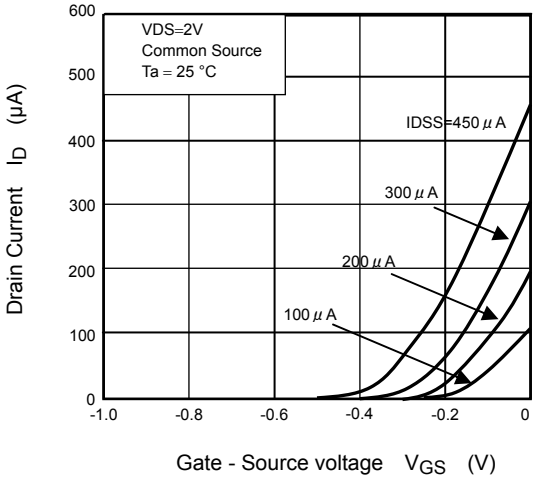
Electrical Characteristics (BK-Rank IDSS Ta=25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain Current	I_{DSS}	V_{DS} = 2 V, V_{GS} = 0	150	—	350	μA
Drain Current	I_D	V_{DD} = 2 V, RL= 2kΩ,Cg = 3pF	—	—	390	μA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	V_{DS} = 2 V, I_D = 1μA	-0.125	—	-1.1	V
Forward transfer admittance	$\|Y_{fs}\|$	V_{DS} = 2 V,V_{GS} = 0V	0.7	1.4	—	mS
Input capacitance	C_{iss}	V_{DS} = 2 V, V_{GS} = 0, f = 1 MHz	—	5.5	—	pF
Voltage Gain	Gv	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF, f = 1kHz	-12.0	—	-7.50	dB
Delta Voltage Gain	DGv(f)	V_{DD} = 2V, RL= 2kΩ,Cg = 3pF,f = 1kHz to 100Hz	—	—	-2.0	dB
Delta Voltage Gain	DGv(V)	V_{DD} = 2V to 1V, RL= 2kΩ,Cg = 3pF,f = 1kHz	—	—	-13.5	dB
Noise Voltage	VN	V_{DD} = 2V, RL= 1kΩ,Cg = 3pF,Gv=80dB,f=A-Curve Filter	—	—	65	mV

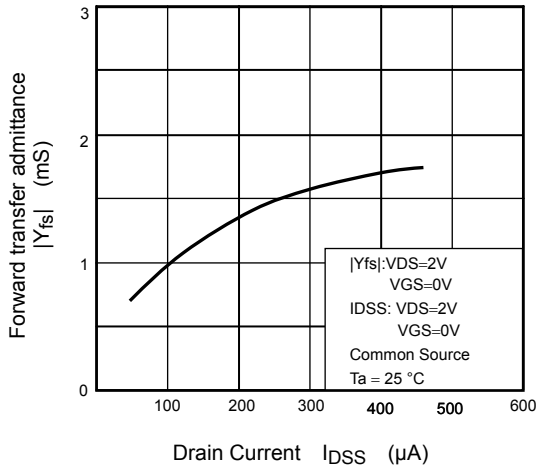
$I_D - V_{DS}$



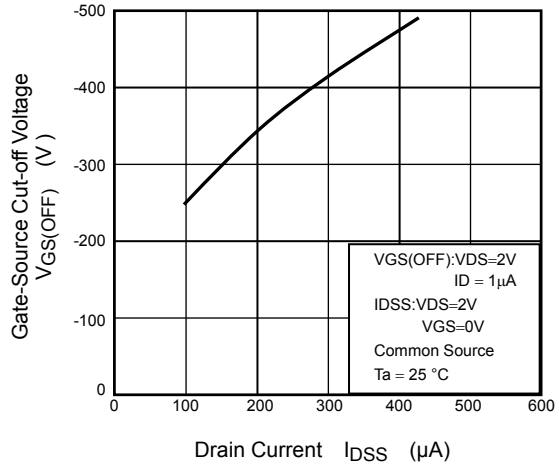
$I_D - V_{GS}$



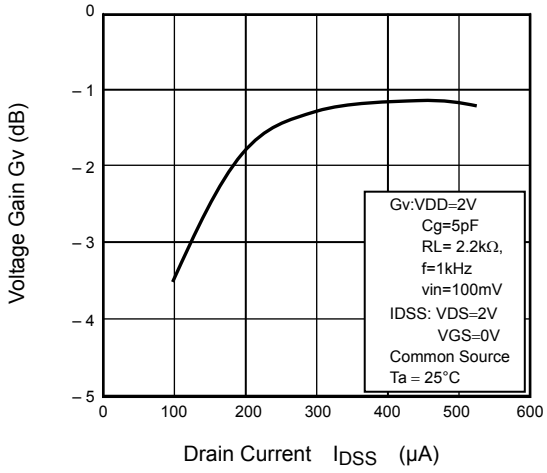
$|Yfs| - I_{DSS}$



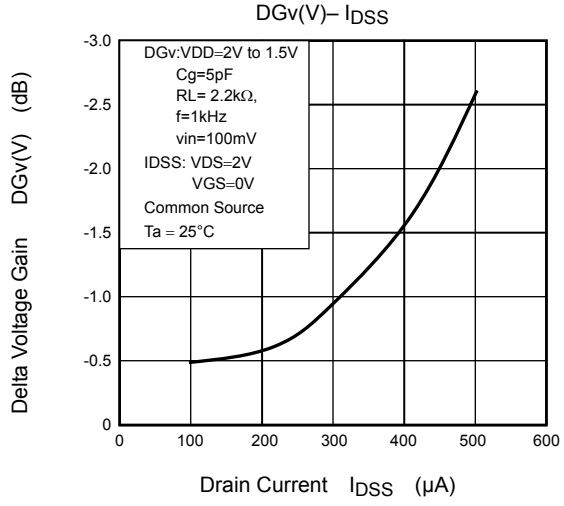
$V_{GS(OFF)} - I_{DSS}$

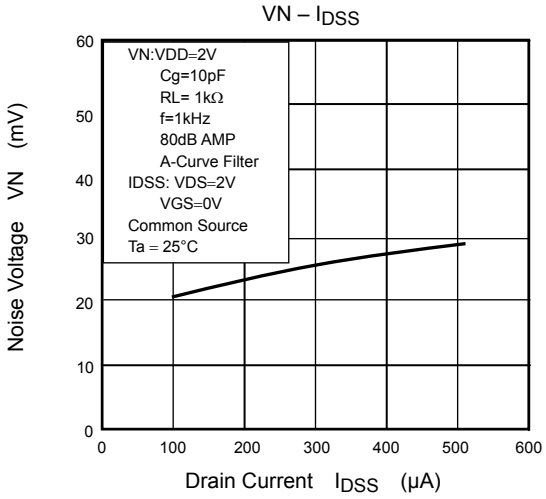


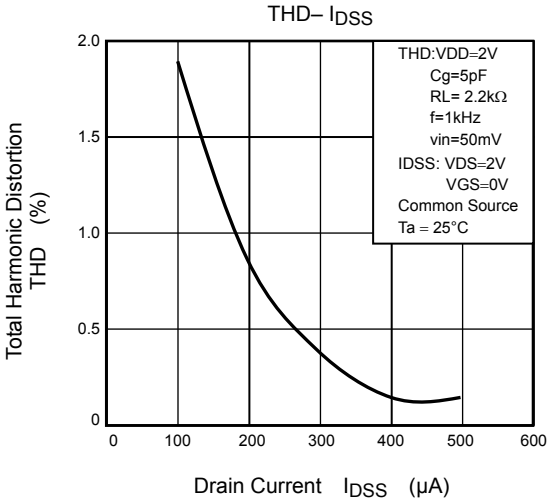
$Gv - I_{DSS}$

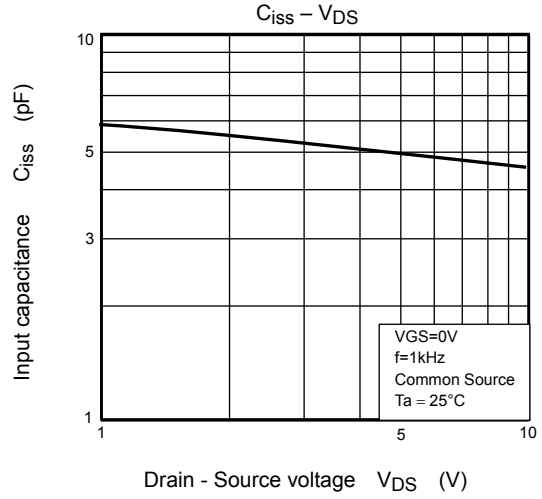


$DGv(V) - I_{DSS}$




VN – IDSS
VN:VDD=2V
Cg=10pF
RL= 1kΩ
f=1kHz
80dB AMP
A-Curve Filter
IDSS: VDS=2V
VGS=0V
Common Source
Ta = 25°C
Noise Voltage VN (mV)
Drain Current IDSS (μA)
0
10
20
30
40
50
60
0
100
200
300
400
500
600


THD– IDSS
THD:VDD=2V
Cg=5pF
RL= 2.2kΩ
f=1kHz
vin=50mV
IDSS: VDS=2V
VGS=0V
Common Source
Ta = 25°C
Total Harmonic Distortion THD (%)
Drain Current IDSS (μA)
0
0.5
1.0
1.5
2.0
0
100
200
300
400
500
600


Ciss – VDS
VGS=0V
f=1kHz
Common Source
Ta = 25°C
Input capacitance Ciss (pF)
Drain - Source voltage VDS (V)
1
3
5
10
1
5
10

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20070701-EN GENERAL

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