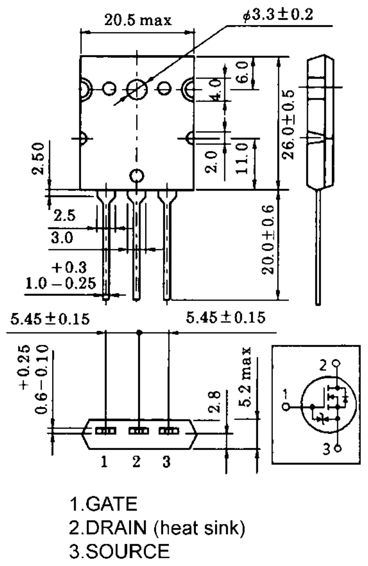
TOSHIBA Field Effect Transistor Silicon N Channel MOS Type ($L^2-\pi-$MOSV)

2SK2267

Chopper Regulator, DC−DC Converter and Motor Drive Applications

Unit: mm



JEDEC	—
JEITA	—
TOSHIBA	2-21F1B

Weight: 9.75 g (typ.)

- 4 V gate drive
- Low drain−source ON resistance : $R_{DS\ (ON)}$ = 8 mΩ (typ.)
- High forward transfer admittance : $|Y_{fs}|$ = 60 S (typ.)
- Low leakage current : I_{DSS} = 100 μA (max) (V_{DS} = 60 V)
- Enhancement−mode : V_{th} = 0.8~2.0 V (V_{DS} = 10 V, I_D = 1 mA)

Maximum Ratings (Ta = 25°C)

Characteristics		Symbol	Rating	Unit
Drain−source voltage		V_{DSS}	60	V
Drain−gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	60	V
Gate−source voltage		V_{GSS}	±20	V
Drain current	DC (Note 1)	I_D	60	A
	Pulse (Note 1)	I_{DP}	240	A
Drain power dissipation (Tc = 25°C)		P_D	150	W
Single pulse avalanche energy (Note 2)		E_{AS}	1054	mJ
Avalanche current		I_{AR}	60	A
Repetitive avalanche energy (Note 3)		E_{AR}	15	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	−55~150	°C

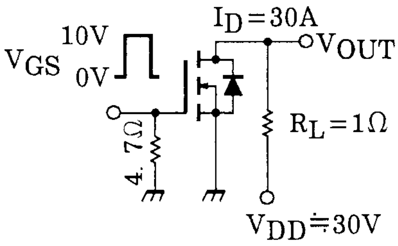
Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	0.833	°C / W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	35.7	°C / W

Note 1: Please use devices on condition that the channel temperature is below 150°C.
Note 2: V_{DD} = 25 V, T_{ch} = 25°C (initial), L = 398 μH, R_G = 25 Ω, I_{AR} = 60 A
Note 3: Repetitive rating: Pulse width limited by maximum channel temperature

This transistor is an electrostatic sensitive device.
Please handle with caution.

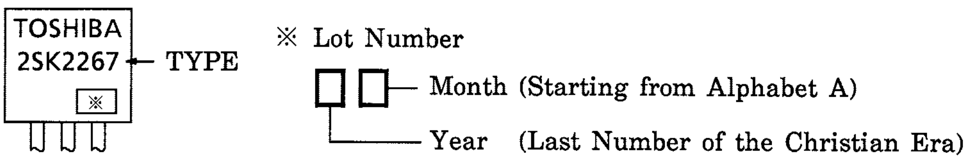
Electrical Characteristics (Ta = 25°C)

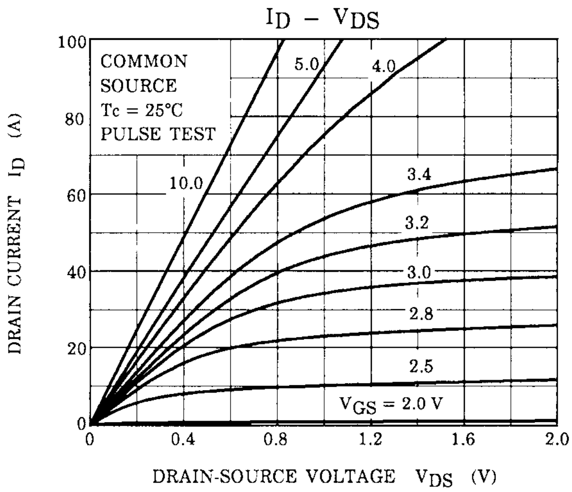
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V	—	—	±10	μA
Drain cut−off current		I_{DSS}	V_{DS} = 60 V, V_{GS} = 0 V	—	—	100	μA
Drain−source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	60	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	0.8	—	2.0	V
Drain−source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 4 V, I_D = 30 A	—	12	15	mΩ
			V_{GS} = 10 V, I_D = 30 A	—	8	11	
Forward transfer admittance		$\|Y_{fs}\|$	V_{DS} = 10 V, I_D = 30 A	40	60	—	S
Input capacitance		C_{iss}	V_{DS} = 10 V, V_{GS} = 0 V, f = 1 MHz	—	5400	—	pF
Reverse transfer capacitance		C_{rss}		—	920	—	
Output capacitance		C_{oss}		—	2600	—	
Switching time	Rise time	t_r	 Duty ≦ 1%, t_w = 10 μs	—	30	—	ns
	Turn−on time	t_{on}		—	60	—	
	Fall time	t_f		—	65	—	
	Turn−off time	t_{off}		—	220	—	
Total gate charge (Gate−source plus gate−drain)		Q_g	V_{DD} ≈ 48 V, V_{GS} = 10 V, I_D = 60 A	—	170	—	nC
Gate−source charge		Q_{gs}		—	110	—	
Gate−drain (“miller”) charge		Q_{gd}		—	60	—	

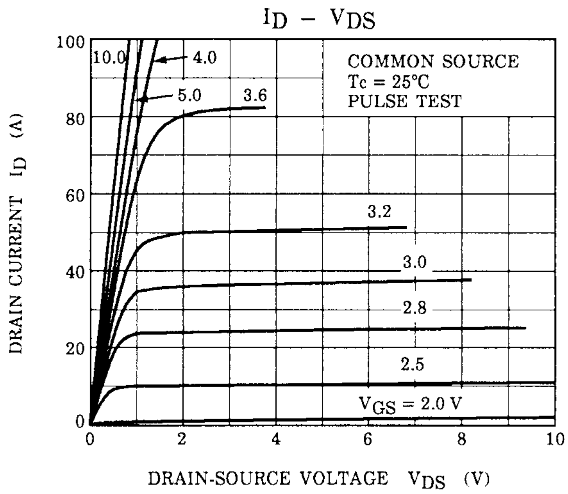
Source−Drain Ratings and Characteristics (Ta = 25°C)

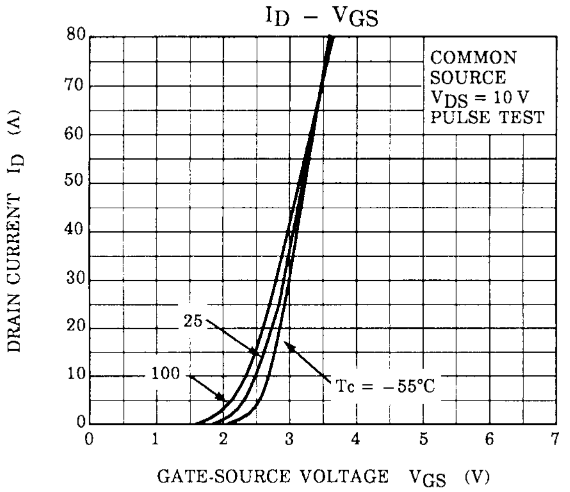
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	60	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	240	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 60 A, V_{GS} = 0 V	—	—	−1.7	V
Reverse recovery time	t_{rr}	I_{DR} = 60 A, V_{GS} = 0 V dI_{DR} / dt = 50 A / μs	—	150	—	ns
Reverse recovered charge	Q_{rr}		—	0.3	—	μC

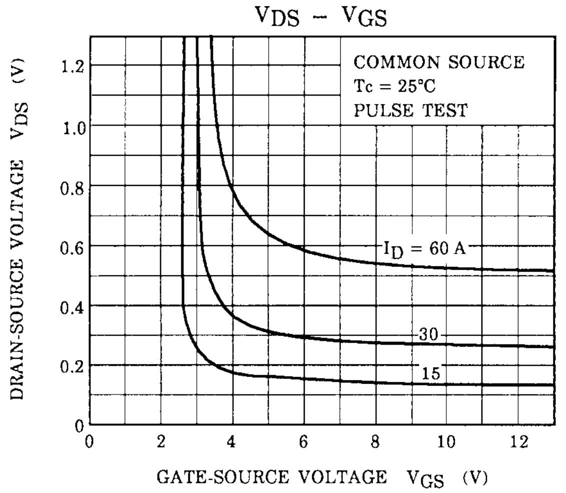
Marking

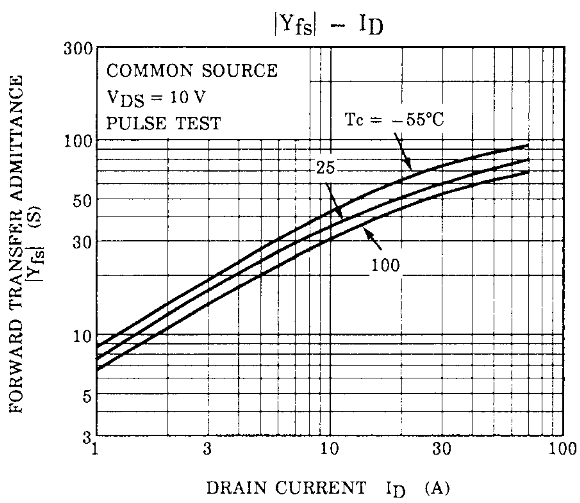


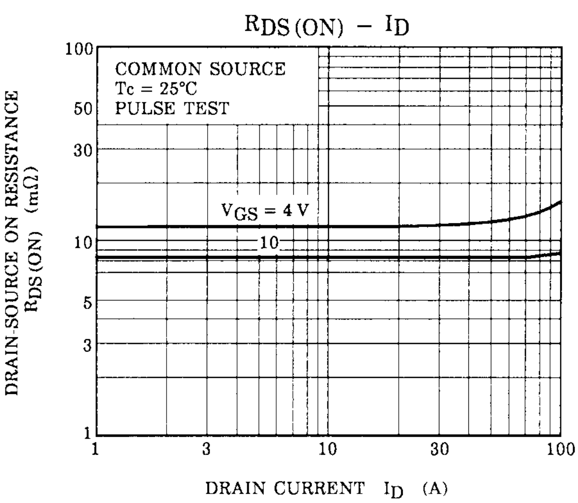

ID – VDS
COMMON SOURCE
Tc = 25°C
PULSE TEST
10.0
5.0
4.0
3.4
3.2
3.0
2.8
2.5
VGS = 2.0 V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)


ID – VDS
COMMON SOURCE
Tc = 25°C
PULSE TEST
10.0
4.0
5.0
3.6
3.2
3.0
2.8
2.5
VGS = 2.0 V
DRAIN CURRENT ID (A)
DRAIN-SOURCE VOLTAGE VDS (V)

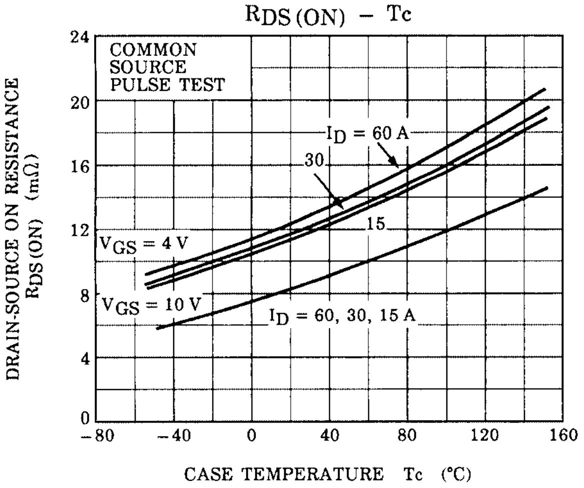

ID – VGS
COMMON SOURCE
VDS = 10 V
PULSE TEST
25
100
Tc = −55°C
DRAIN CURRENT ID (A)
GATE-SOURCE VOLTAGE VGS (V)


VDS – VGS
COMMON SOURCE
Tc = 25°C
PULSE TEST
ID = 60 A
30
15
DRAIN-SOURCE VOLTAGE VDS (V)
GATE-SOURCE VOLTAGE VGS (V)

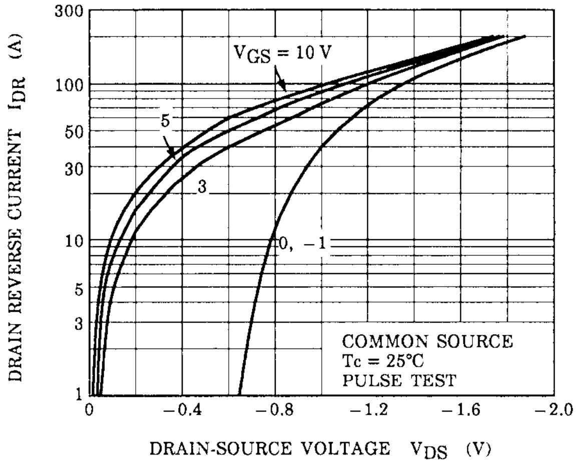

|Yfs| – ID
COMMON SOURCE
VDS = 10 V
PULSE TEST
Tc = −55°C
25
100
FORWARD TRANSFER ADMITTANCE |Yfs| (S)
DRAIN CURRENT ID (A)


RDS (ON) – ID
COMMON SOURCE
Tc = 25°C
PULSE TEST
VGS = 4 V
10
DRAIN-SOURCE ON RESISTANCE RDS (ON) (mΩ)
DRAIN CURRENT ID (A)

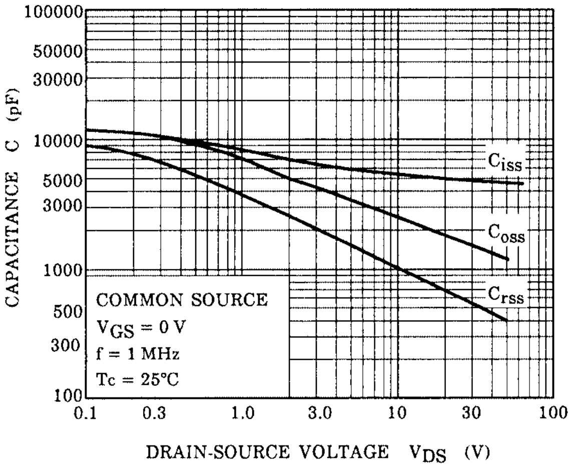
$R_{DS(ON)}$ – Tc



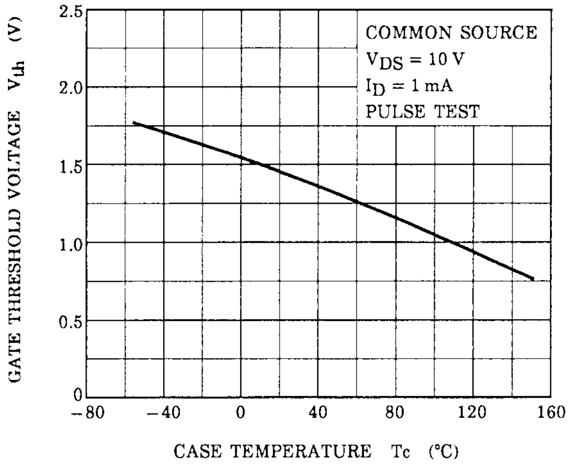
I_{DR} – V_{DS}



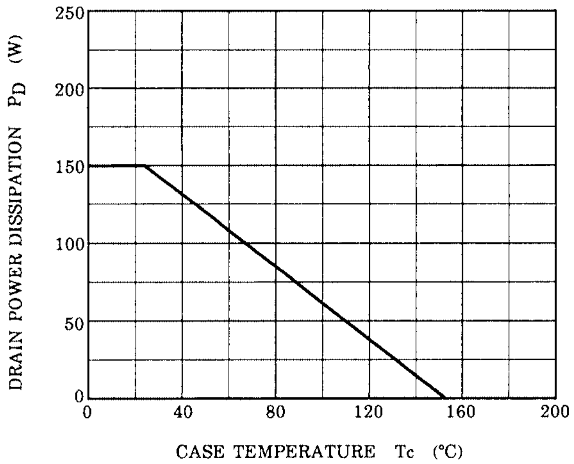
CAPACITANCE – V_{DS}



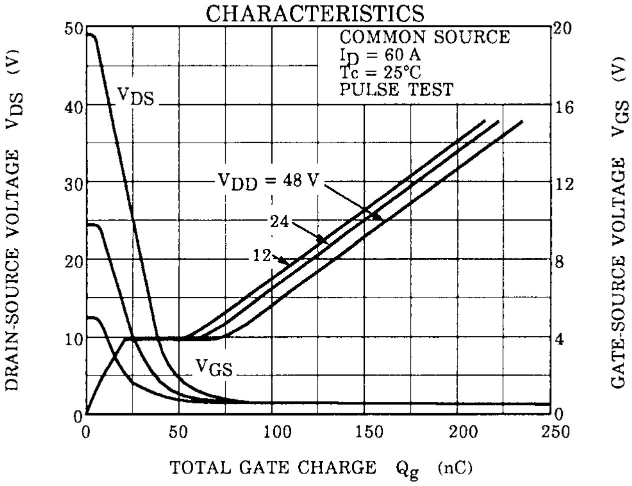
V_{th} – Tc

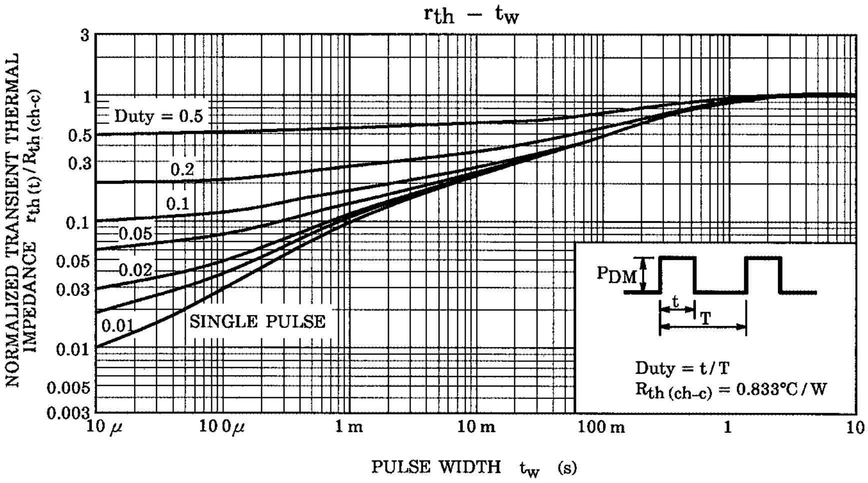


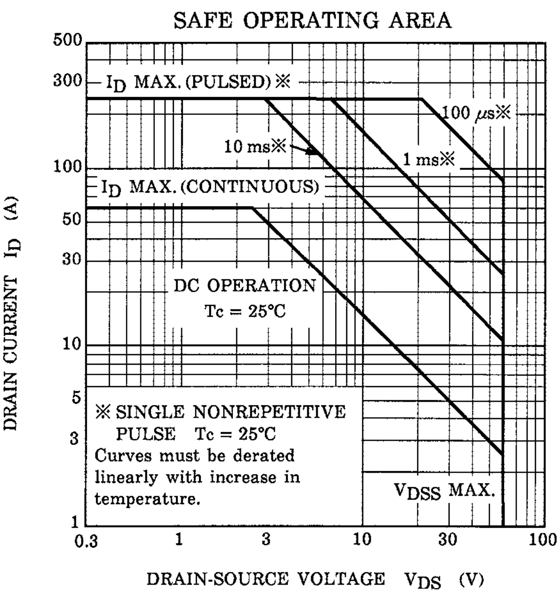
P_D – Tc

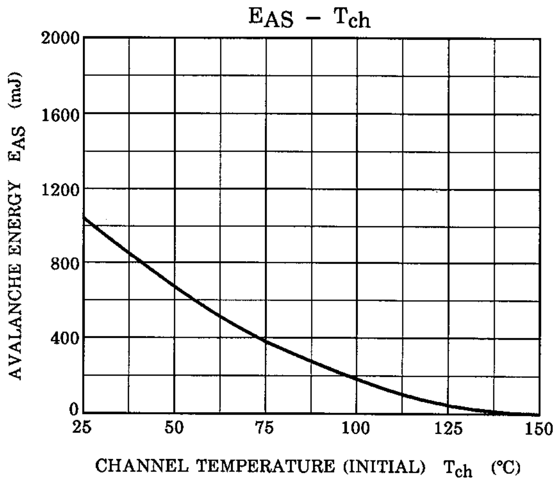


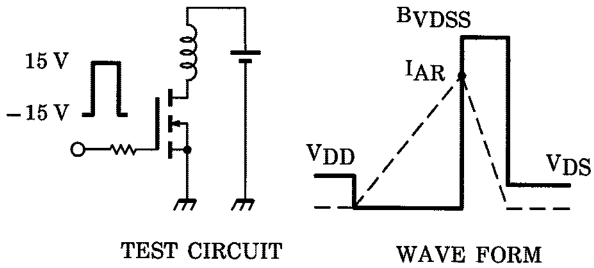
DYNAMIC INPUT / OUTPUT CHARACTERISTICS











$R_G = 25\ \Omega$
$V_{DD} = 25\ V,\ L = 398\ \mu H$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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