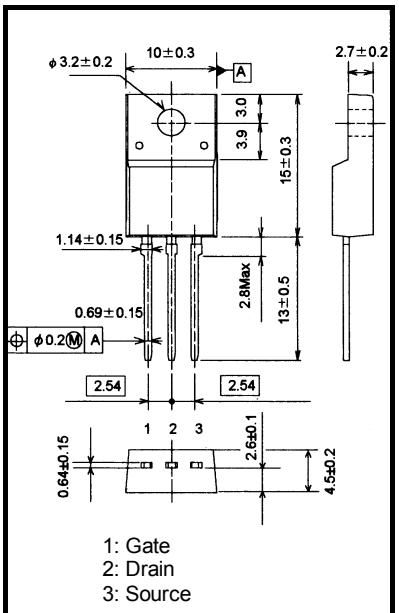
Silicon N-Channel MOS Type (π-MOSVI)

2SK3797

Switching Regulator Applications

Unit: mm



JEDEC	—
JEITA	SC-67
TOSHIBA	2-10U1B

Weight: 1.7 g (typ.)

- Low drain-source ON resistance: $R_{DS\ (ON)}$ = 0.32 Ω (typ.)
- High forward transfer admittance: $|Y_{fs}|$ = 7.5 S (typ.)
- Low leakage current: I_{DSS} = 100 μA (V_{DS} = 600 V)
- Enhancement model: V_{th} = 2.0 to 4.0 V (V_{DS} = 10 V, I_D = 1 mA)

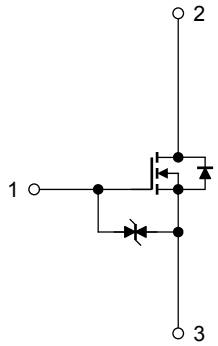
Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	600	V
Drain-gate voltage (R_{GS} = 20 kΩ)		V_{DGR}	600	V
Gate-source voltage		V_{GSS}	±30	V
Drain current	DC (Note 1)	I_D	13	A
	Pulse (t = 1 ms) (Note 1)	I_{DP}	52	
Drain power dissipation (Tc = 25°C)		P_D	50	W
Single pulse avalanche energy (Note 2)		E_{AS}	1033	mJ
Avalanche current		I_{AR}	13	A
Repetitive avalanche energy (Note 3)		E_{AR}	5.0	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55 to 150	°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).

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th\ (ch-c)}$	2.5	°C/W
Thermal resistance, channel to ambient	$R_{th\ (ch-a)}$	62.5	°C/W



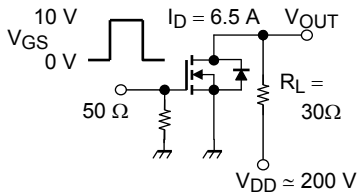
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: V_{DD} = 90 V, T_{ch} = 25°C (initial), L = 10.7 mH, I_{AR} = 13 A, R_G = 25 Ω

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Handle with care.

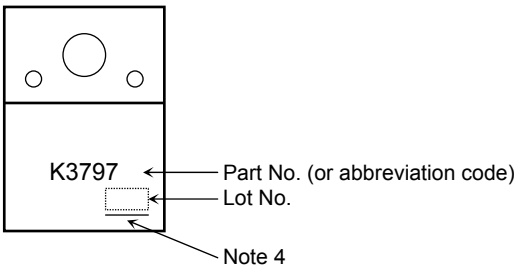
Electrical Characteristics (Ta = 25°C)

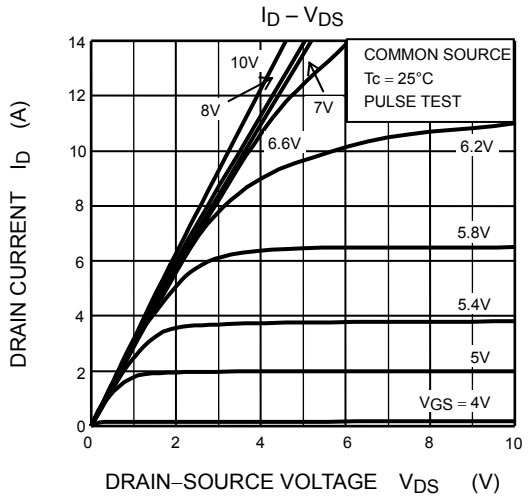
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	V_{GS} = ±25 V, V_{DS} = 0 V	—	—	±10	μA
Gate-source breakdown voltage		$V_{(BR)\ GSS}$	I_G = ±10 μA, V_{DS} = 0 V	±30	—	—	V
Drain cutoff current		I_{DSS}	V_{DS} = 600 V, V_{GS} = 0 V	—	—	100	μA
Drain-source breakdown voltage		$V_{(BR)\ DSS}$	I_D = 10 mA, V_{GS} = 0 V	600	—	—	V
Gate threshold voltage		V_{th}	V_{DS} = 10 V, I_D = 1 mA	2.0	—	4.0	V
Drain-source ON resistance		$R_{DS\ (ON)}$	V_{GS} = 10 V, I_D = 6.5 A	—	0.32	0.43	Ω
Forward transfer admittance		$\lvert Y_{fs} \rvert$	V_{DS} = 10 V, I_D = 7.0 A	2.1	7.5	—	S
Input capacitance		C_{iss}	V_{DS} = 25 V, V_{GS} = 0 V, f = 1 MHz	—	3100	—	pF
Reverse transfer capacitance		C_{rss}		—	20	—	
Output capacitance		C_{oss}		—	270	—	
Switching time	Rise time	t_r		—	60	—	ns
	Turn-on time	t_{on}		—	110	—	
	Fall time	t_f		—	50	—	
	Turn-off time	t_{off}	Duty ≤ 1%, t_w = 10 μs	—	215	—	
Total gate charge		Q_g	V_{DD} ≃ 400 V, V_{GS} = 10 V, I_D = 13 A	—	62	—	nC
Gate-source charge		Q_{gs}		—	40	—	
Gate-drain charge		Q_{gd}		—	22	—	

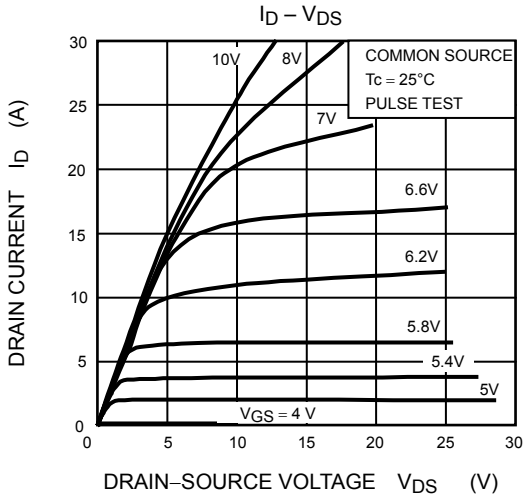
Source-Drain Ratings and Characteristics (Ta = 25°C)

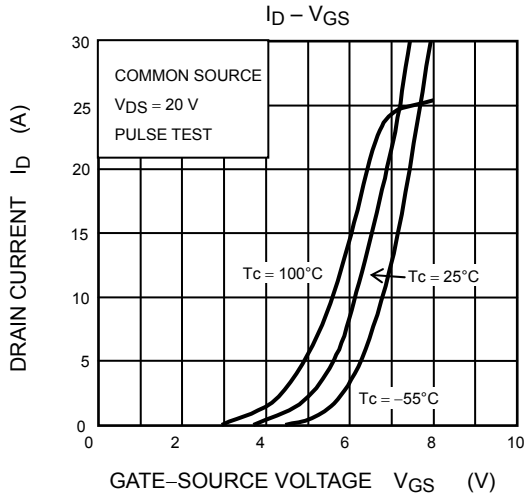
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	13	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	52	A
Forward voltage (diode)	V_{DSF}	I_{DR} = 13 A, V_{GS} = 0 V	—	—	−1.7	V
Reverse recovery time	t_{rr}	I_{DR} = 13 A, V_{GS} = 0 V,	—	1050	—	ns
Reverse recovery charge	Q_{rr}	dI_{DR}/dt = 100 A/μs	—	15	—	μC

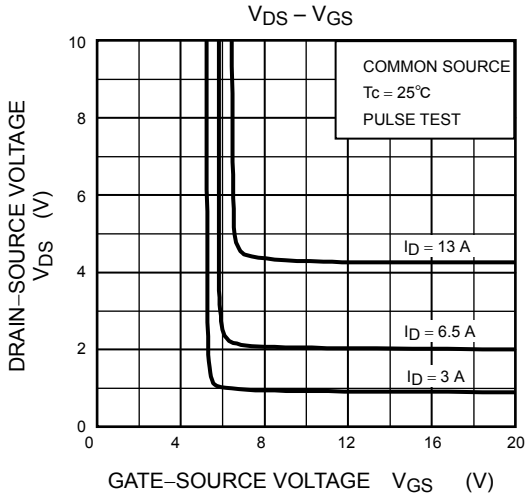
Marking

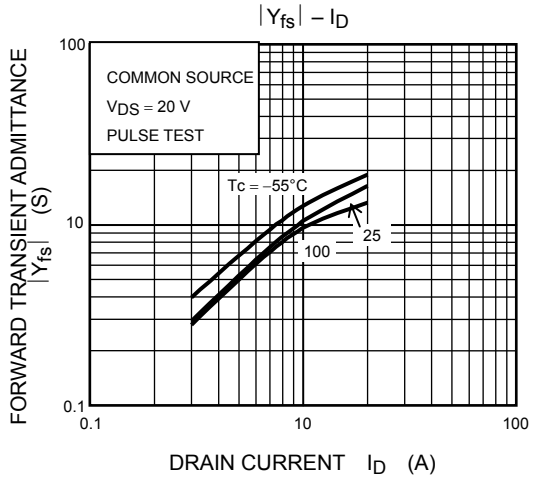


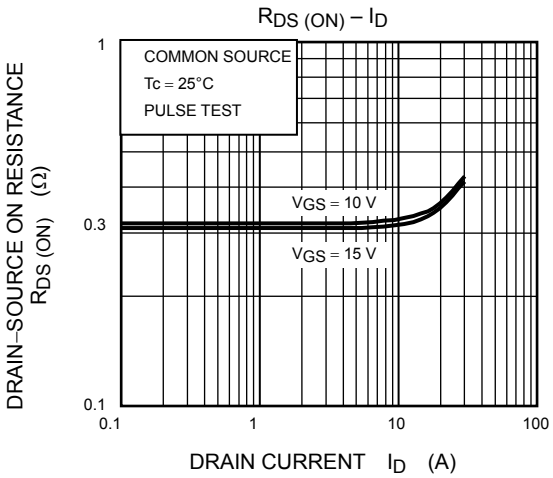

ID – VDS
COMMON SOURCE
Tc = 25°C
PULSE TEST
10V
8V
7V
6.6V
6.2V
5.8V
5.4V
5V
VGS = 4V
DRAIN CURRENT ID (A)
DRAIN–SOURCE VOLTAGE VDS (V)


ID – VDS
COMMON SOURCE
Tc = 25°C
PULSE TEST
10V
8V
7V
6.6V
6.2V
5.8V
5.4V
5V
VGS = 4 V
DRAIN CURRENT ID (A)
DRAIN–SOURCE VOLTAGE VDS (V)


ID – VGS
COMMON SOURCE
VDS = 20 V
PULSE TEST
Tc = 100°C
Tc = 25°C
Tc = –55°C
DRAIN CURRENT ID (A)
GATE–SOURCE VOLTAGE VGS (V)


VDS – VGS
COMMON SOURCE
Tc = 25°C
PULSE TEST
ID = 13 A
ID = 6.5 A
ID = 3 A
DRAIN–SOURCE VOLTAGE VDS (V)
GATE–SOURCE VOLTAGE VGS (V)


|Yfs| – ID
COMMON SOURCE
VDS = 20 V
PULSE TEST
Tc = –55°C
25
100
FORWARD TRANSIENT ADMITTANCE |Yfs| (S)
DRAIN CURRENT ID (A)


RDS (ON) – ID
COMMON SOURCE
Tc = 25°C
PULSE TEST
VGS = 10 V
VGS = 15 V
DRAIN–SOURCE ON RESISTANCE RDS (ON) (Ω)
DRAIN CURRENT ID (A)