

TJ20A10M3

Switching Regulator Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 63 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 50 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -100 \text{ V}$)
- Enhancement-model: $V_{th} = -2.0 \text{ to } -4.0 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-100	V
Gate-source voltage		V_{GSS}	± 20	V
Drain current	DC (Note 1)	I_D	-20	A
	Pulse (Note 1)	I_{DP}	-40	
Drain power dissipation ($T_c = 25^\circ\text{C}$)		P_D	35	W
Single pulse avalanche energy (Note 2)		E_{AS}	124	mJ
Avalanche current		I_{AR}	-20	A
Repetitive avalanche energy (Note 3)		E_{AR}	2.29	mJ
Channel temperature		T_{ch}	150	$^\circ\text{C}$
Storage temperature range		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).

Note 1: Please use devices on condition that the channel temperature is below 150°C .

Note 2: $V_{DD} = -25 \text{ V}$, $T_{ch} = 25^\circ\text{C}$, $L = 500 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AR} = -20 \text{ A}$

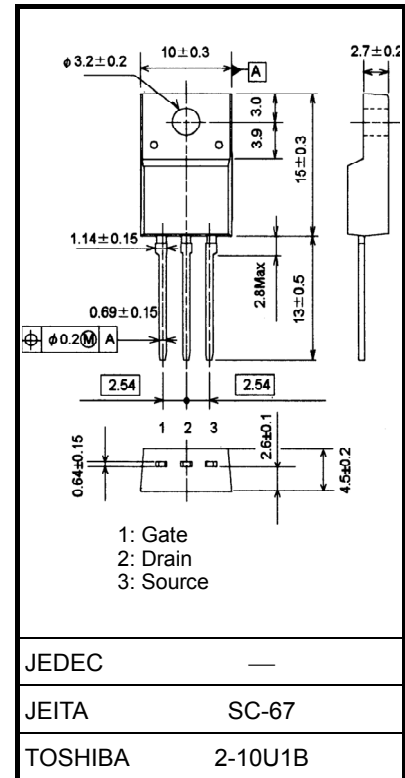
Note 3: Repetitive rating; pulse width limited by maximum channel temperature.

Thermal Characteristics

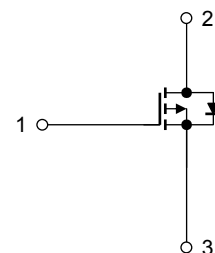
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	3.57	$^\circ\text{C} / \text{W}$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	62.5	$^\circ\text{C} / \text{W}$

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

Unit: mm

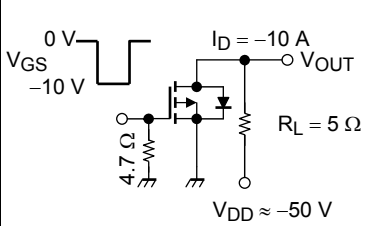


Weight: 1.7 g (typ.)



Start of commercial production
2009-03

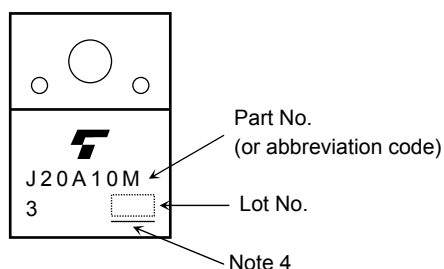
Electrical Characteristics (Ta = 25°C)

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 100	nA
Drain cut-OFF current		I_{DSS}	$V_{DS} = -100 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-100	—	—	V
		$V_{(BR) DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$	-75	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-2.0	—	-4.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -10 \text{ V}, I_D = -10 \text{ A}$	—	63	90	m Ω
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -10 \text{ A}$	25	50	—	S
Input capacitance		C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	5500	—	pF
Reverse transfer capacitance		C_{rss}		—	200	—	
Output capacitance		C_{oss}		—	290	—	
Switching time	Rise time	t_r	 $I_D = -10 \text{ A}$ $V_{DD} \approx -50 \text{ V}$ $R_L = 5 \Omega$ $V_{GS} = 0 \text{ V}, -10 \text{ V}$ 4.7Ω $Duty \leq 1\%, t_w = 10 \mu\text{s}$	—	13	—	ns
	Turn-on time	t_{on}		—	27	—	
	Fall time	t_f		—	105	—	
	Turn-off time	t_{off}		—	420	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -80 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -20 \text{ A}$	—	120	—	nC
Gate-source charge		Q_{gs}		—	20	—	
Gate-drain ("miller") charge		Q_{gd}		—	32	—	

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

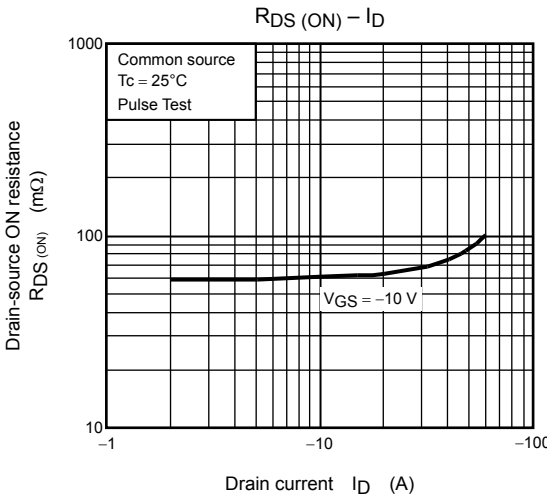
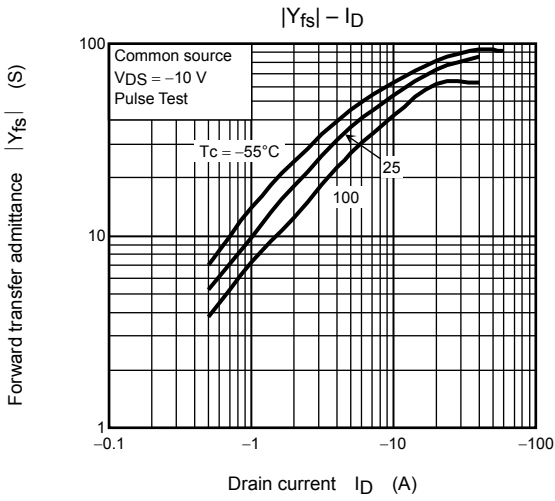
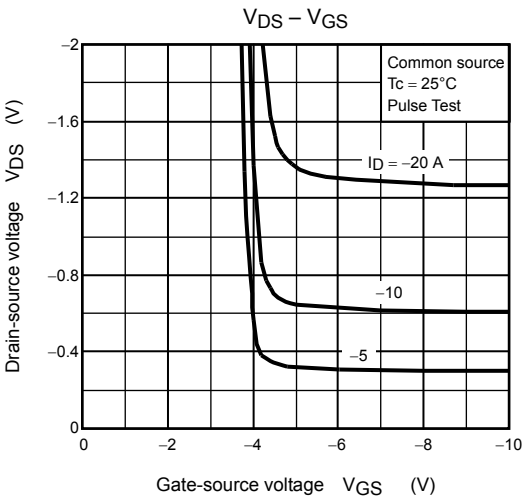
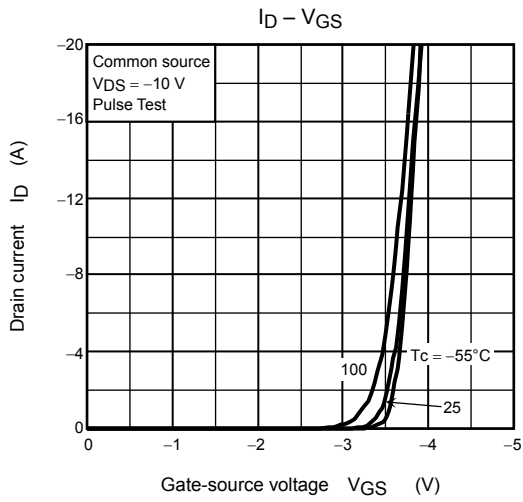
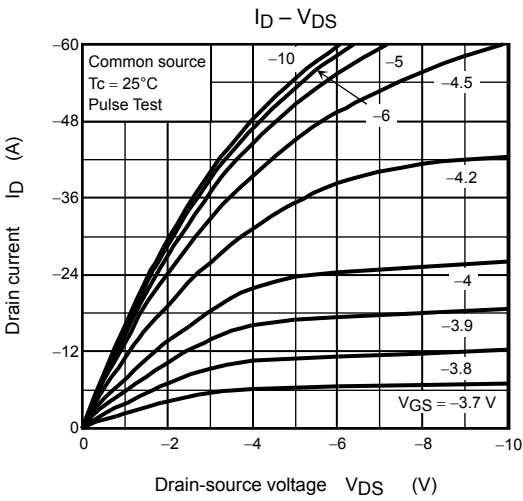
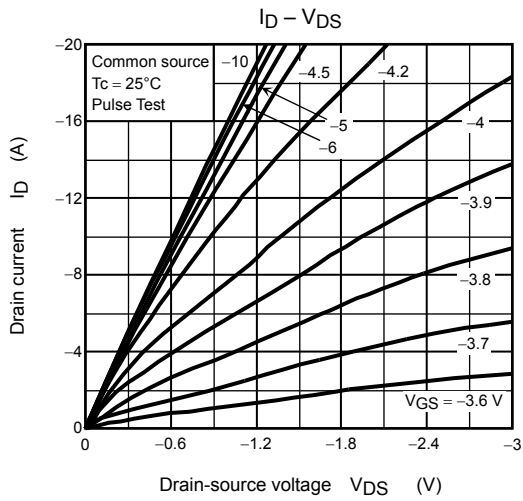
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I_{DR}	—	—	—	-20	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	-40	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = -20 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.4	V
Reverse recovery time	t_{rr}	$I_{DR} = -20 \text{ A}, V_{GS} = 0 \text{ V},$	—	76	—	ns
Reverse recovery charge	Q_{rr}	$dI_{DR}/dt = -50 \text{ A}/\mu\text{s}$	—	104	—	nC

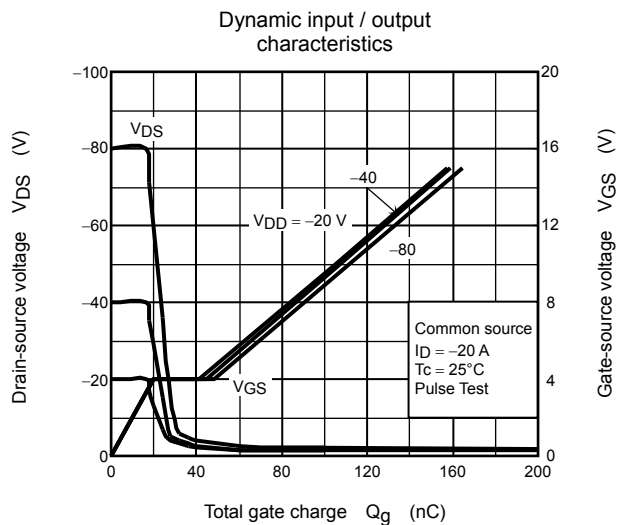
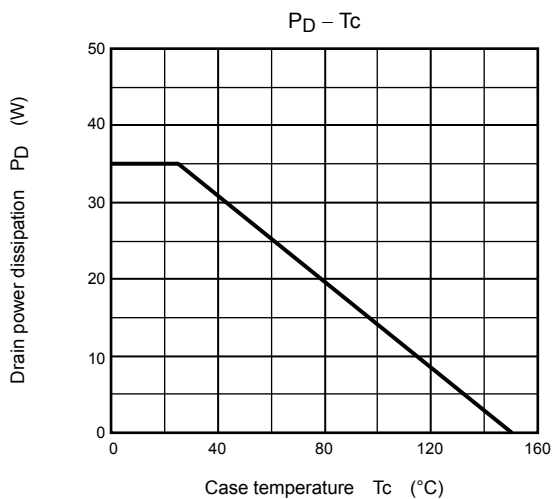
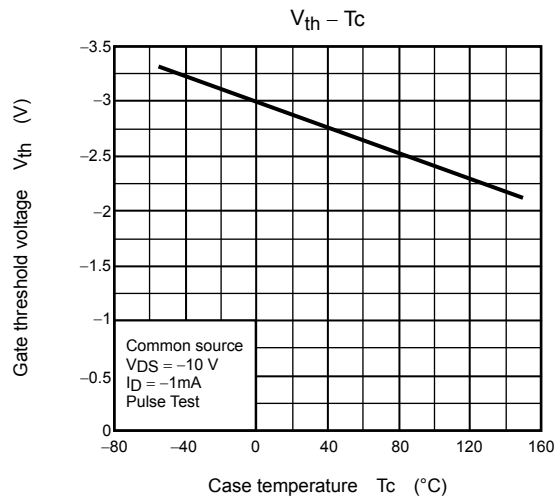
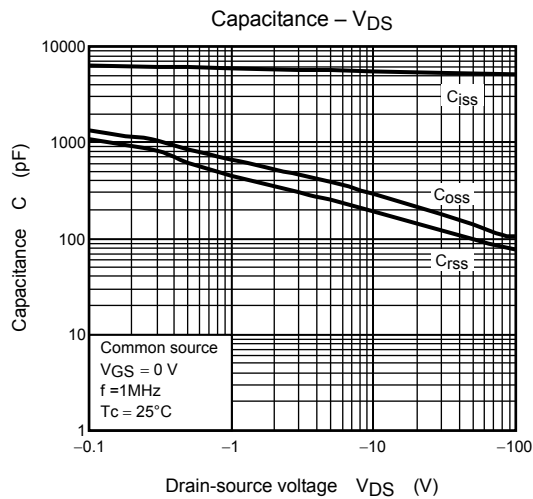
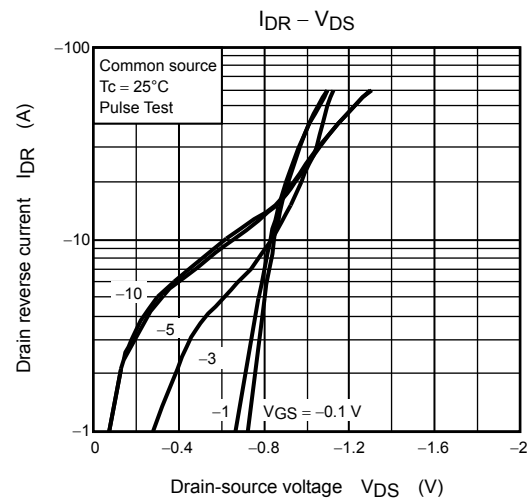
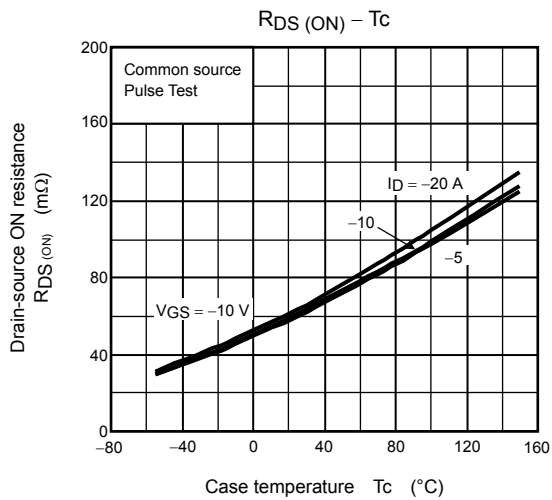
Marking

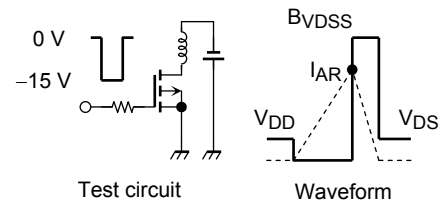
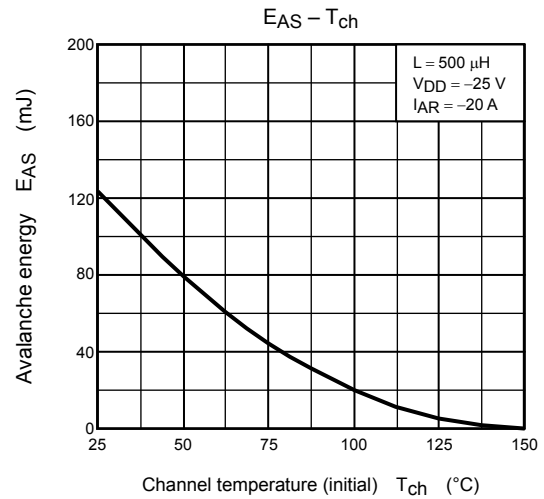
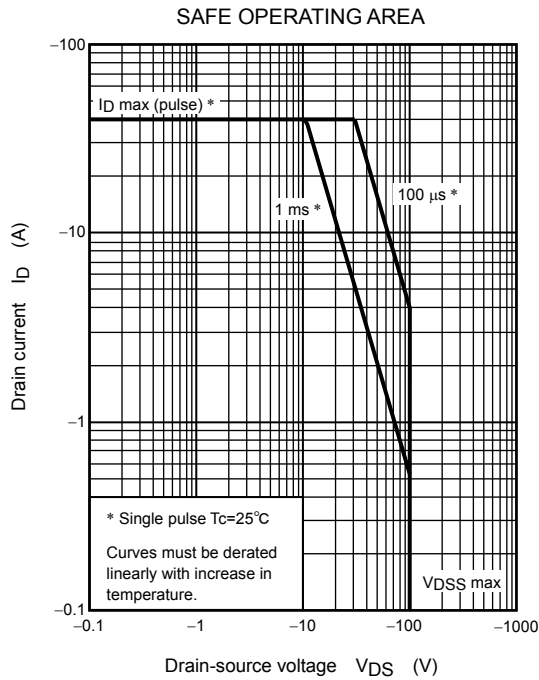
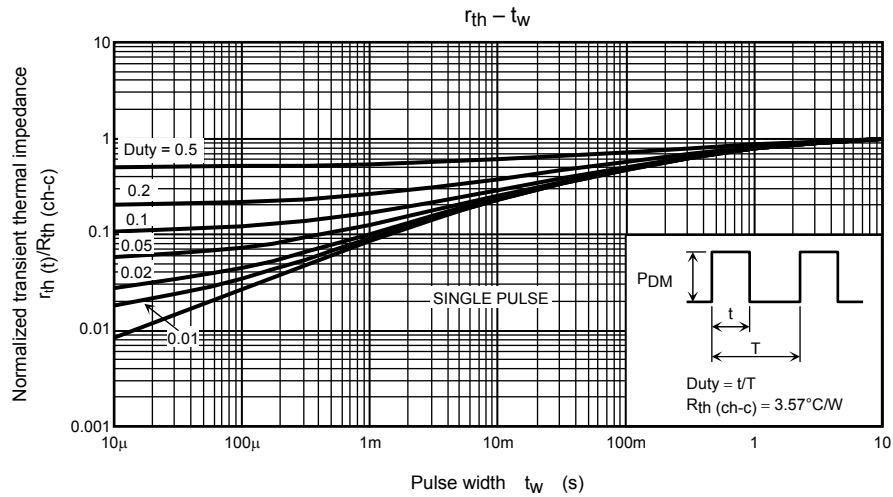


Note 4: A line under a Lot No. identifies the indication of product Labels
 Not underlined: [[Pb]]/INCLUDES > MCV
 Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.







$$R_G = 25 \, \Omega$$

$$V_{DD} = -25 \, V, L = 500 \, \mu H$$

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

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