

TOSHIBA FIELD EFFECT TRANSISTOR SILICON N CHANNEL MOS TYPE ( $\pi$ -MOSVI)

# TPC8201

LITHIUM ION BATTERY

NOTE BOOK PC

PORTABLE MACHINES AND TOOLS

INDUSTRIAL APPLICATIONS

Unit in mm

- Low Drain-Source ON Resistance :  $R_{DS(ON)} = 37 \text{ m}\Omega$  (Typ.)
- High Forward Transfer Admittance:  $|Y_{fs}| = 6 \text{ S}$  (Typ.)
- Low Leakage Current :  $I_{DSS} = 10 \mu\text{A}$  (Max.) ( $V_{DS} = 30 \text{ V}$ )
- Enhancement-Mode :  $V_{th} = 0.8 \sim 2.0 \text{ V}$   
( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ )

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC		SYMBOL	RATING	UNIT
Drain-Source Voltage		$V_{DSS}$	30	V
Drain-Gate Voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	30	V
Gate-Source Voltage		$V_{GSS}$	$\pm 20$	V
Drain Current	DC	$I_D$	5	A
	Pulse	$I_{DP}$	20	A
Drain Power Dissipation*** ( $T_a = 25^\circ\text{C}$ )		$P_D$	2.0	W
Single Pulse Avalanche Energy**		$E_{AS}$	32.5	mJ
Avalanche Current		$I_{AR}$	5	A
Repetitive Avalanche Energy*		$E_{AR}$	0.2	mJ
Channel Temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage Temperature Range		$T_{stg}$	$-55 \sim 150$	$^\circ\text{C}$

THERMAL CHARACTERISTICS

CHARACTERISTIC	SYMBOL	MAX.	UNIT
Thermal Resistance, Channel to Ambient***	$R_{th(ch-a)}$	62.5	$^\circ\text{C/W}$

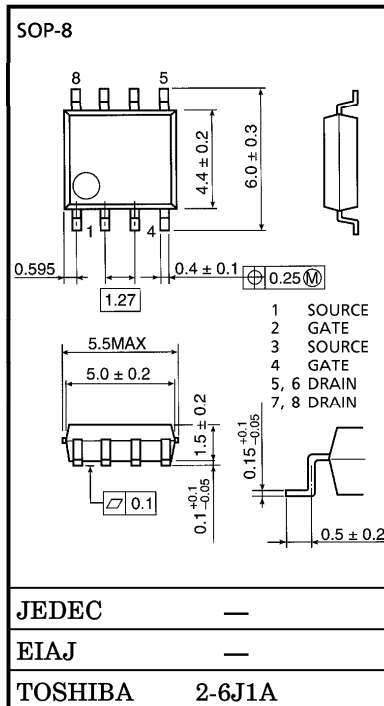
Note ;

- \* Repetitive rating ; Pulse Width Limited by Max. Junction temperature.
- \*\*  $V_{DD} = 24 \text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 1.0 \text{ mH}$ ,  $R_G = 25 \Omega$ ,  $I_{AR} = 5.0 \text{ A}$
- \*\*\* Drive operation ; Mount on glass epoxy board [ $1 \text{ inch}^2 \times 0.8 \text{ t}$ ]  
in the two devices driving ( $t = 10 \text{ s}$ )

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

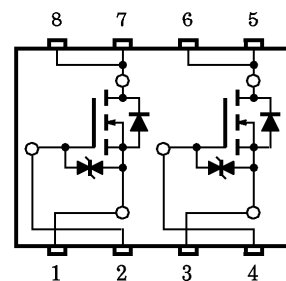
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Weight : 0.08 g

CIRCUIT CONFIGURATION



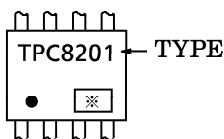
ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Leakage Current		$I_{GSS}$	$V_{GS} = \pm 16\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain Cut-Off Current		$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-Source Breakdown Voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
Gate Threshold Voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	0.8	—	2.0	V
Drain-Source ON Resistance		$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 2.5\text{ A}$	—	58	80	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 2.5\text{ A}$	—	37	50	$\text{m}\Omega$
Forward Transfer Admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	3	6	—	S
Input Capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	—	475	—	pF
Reverse Transfer Capacitance		$C_{rss}$		—	85	—	
Output Capacitance		$C_{oss}$		—	270	—	
Switching Time	Rise Time	$t_r$	<p><math>I_D = 2.5\text{ A}</math> <math>V_{GS} = 10\text{ V}, 0\text{ V}</math> <math>R_L = 6\ \Omega</math> <math>V_{DD} \doteq 15\text{ V}</math></p>	—	10	—	ns
	Turn-On Time	$t_{on}$		—	16	—	
	Fall Time	$t_f$		—	13	—	
	Turn-Off Time	$t_{off}$		$V_{IN} : t_r, t_f < 5\text{ ns}$ $\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}$	—	70	
Total Gate Charge (Gate-Source Plus Gate-Drain)		$Q_g$	$V_{DD} \doteq 24\text{ V}, V_{GS} = 10\text{ V}$	—	16	—	nC
Gate-Source Charge		$Q_{gs}$	$I_D = 5\text{ A}$	—	11	—	
Gate-Drain (“Miller”) Charge		$Q_{gd}$		—	5	—	

SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Continuous Drain Reverse Current	$I_{DR}$	—	—	—	5	A
Pulse Drain Reverse Current	$I_{DRP}$	—	—	—	20	A
Diode Forward Voltage	$V_{DSF}$	$I_{DR} = 5\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V

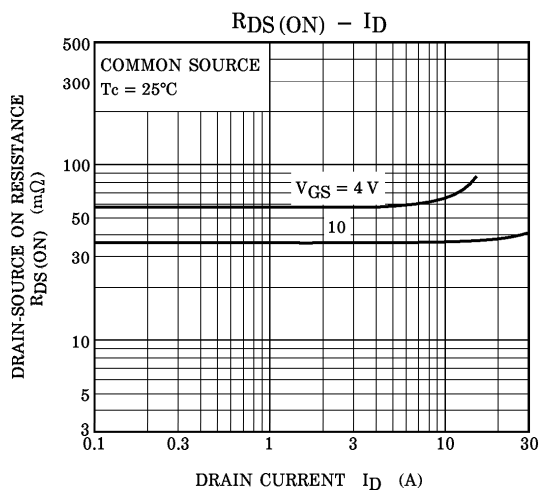
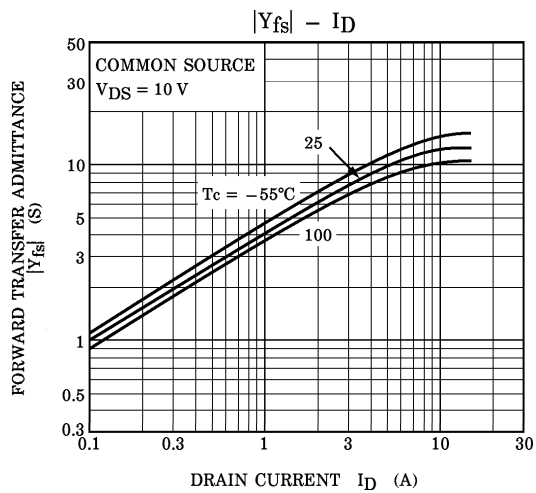
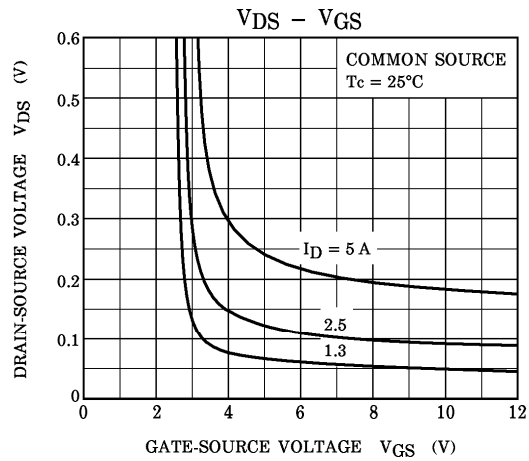
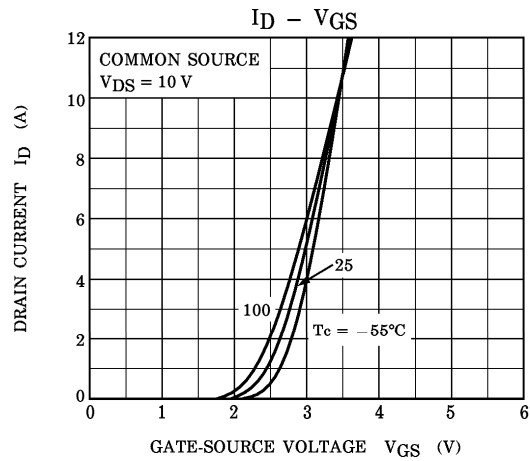
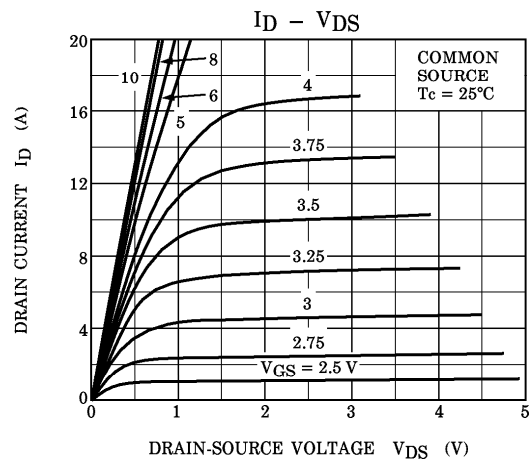
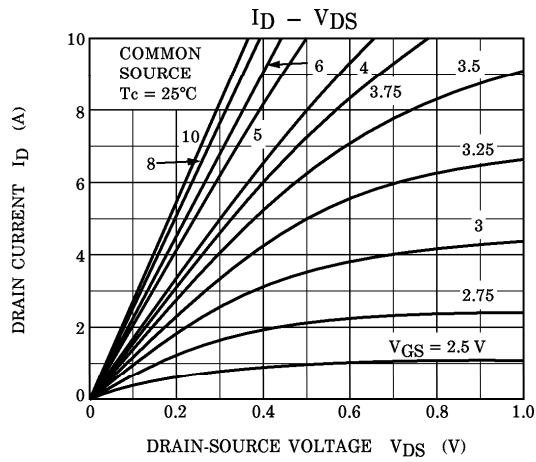
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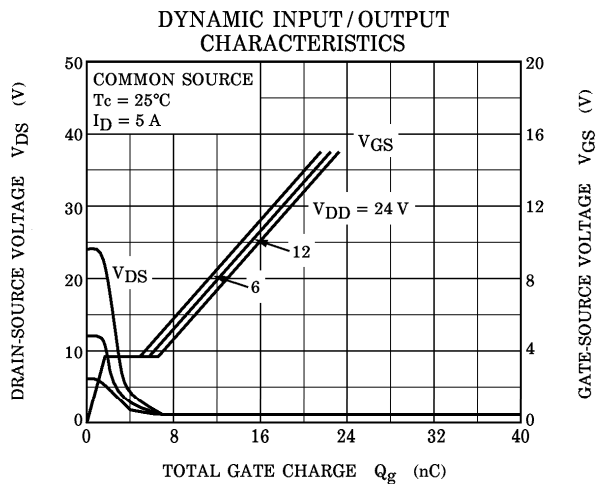
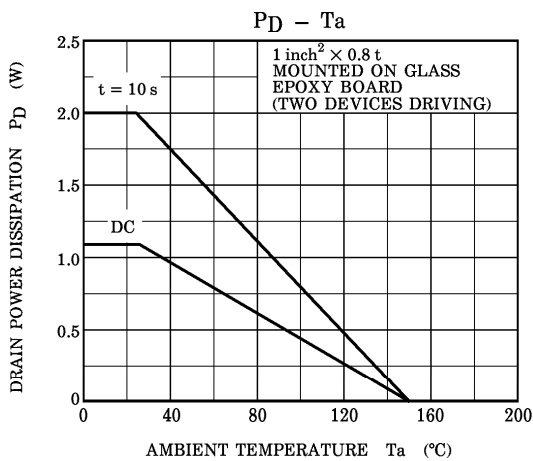
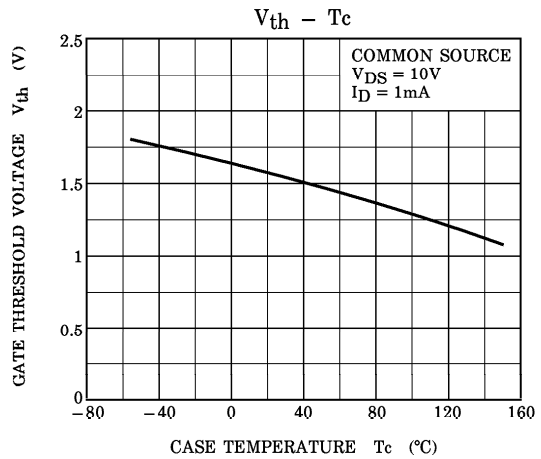
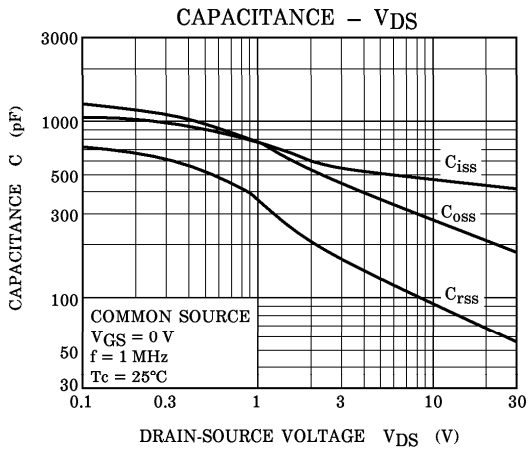
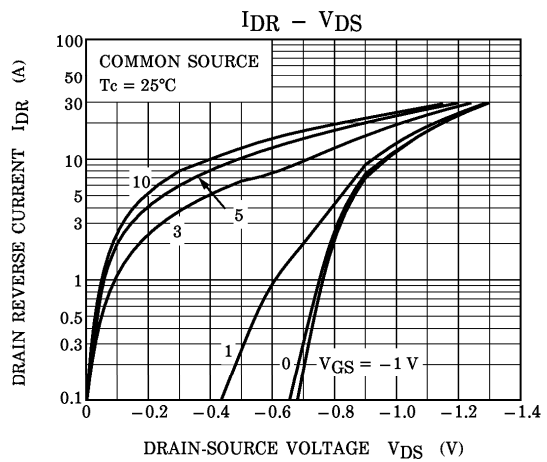
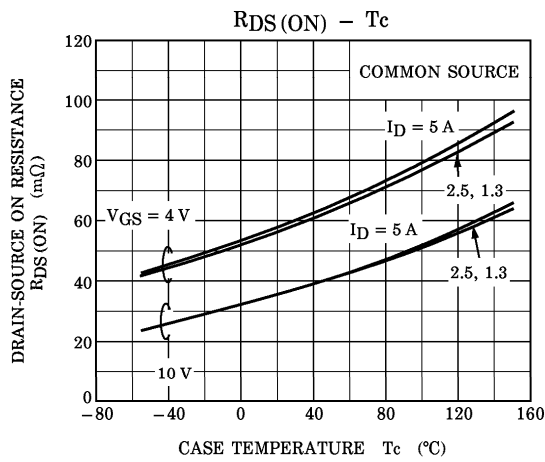


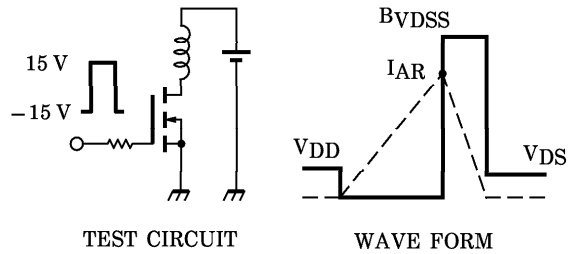
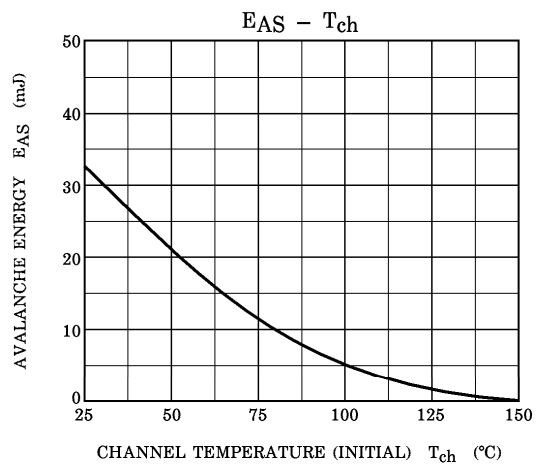
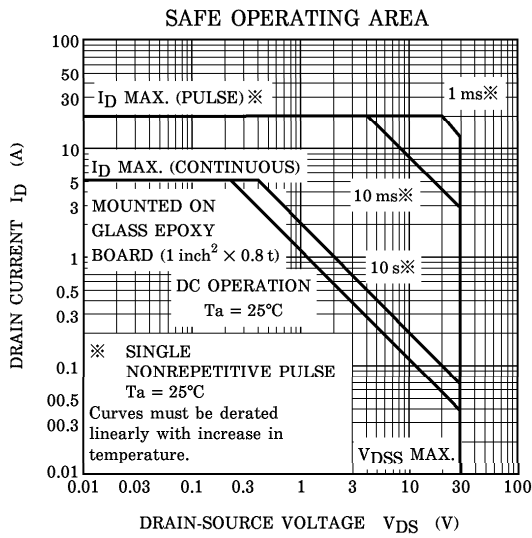
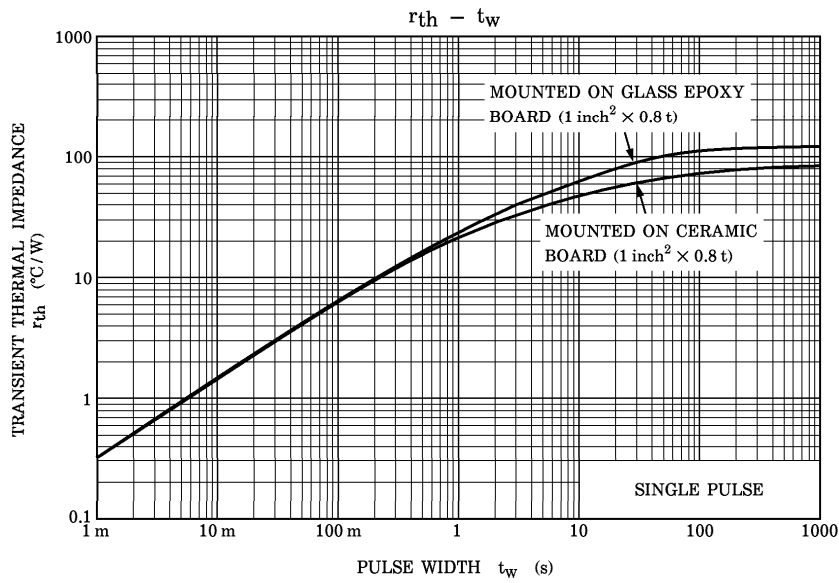
※ Lot Number

□ □ — Month (Starting from Alphabet A)

□ — Year (Last Number of the Christian Era)







Peak  $I_{AR} = 5$  A,  $R_G = 25 \Omega$   
 $V_{DD} = 24$  V,  $L = 1.0$  mH

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