

TPC8305

Lithium Ion Battery Applications
 Portable Equipment Applications
 Notebook PC Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance : $R_{DS(ON)} = 24 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 12 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = -10 \text{ }\mu\text{A}$ (max) ($V_{DS} = -20 \text{ V}$)
- Enhancement mode : $V_{th} = -0.5 \sim -1.2 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

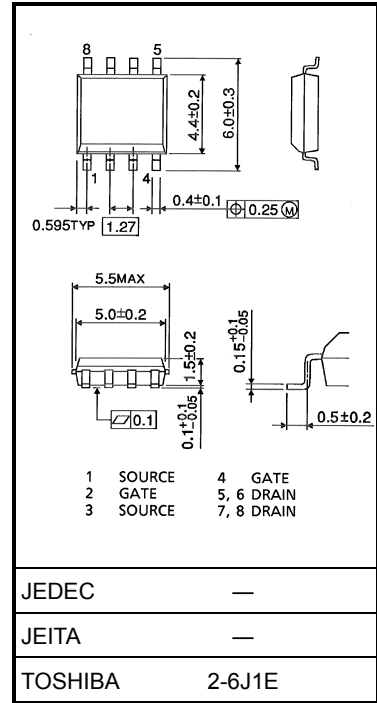
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)		V_{DGR}	-20	V
Gate-source voltage		V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	-5	A
	Pulse	I_{DP}	-20	
Drain power dissipation (t = 10s) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.5	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	1.0	
Drain power dissipation (t = 10s) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.75	W
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.45	
Single pulse avalanche energy (Note 4)		E_{AS}	32.5	mJ
Avalanche current (Note 1)		I_{AR}	-5	A
Repetitive avalanche energy Single-device value at operation (Note 2a, Note 3b, Note 5)		E_{AR}	0.10	mJ
Channel temperature		T_{ch}	150	°C
Storage temperature range		T_{stg}	-55~150	°C

Note: (Note 1), (Note 2a), (Note 2b), (Note 3a), (Note 3b), (Note 4) and (Note 5): See the next page.

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).

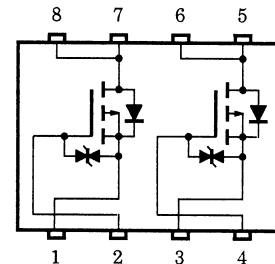
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.08 g (typ.)

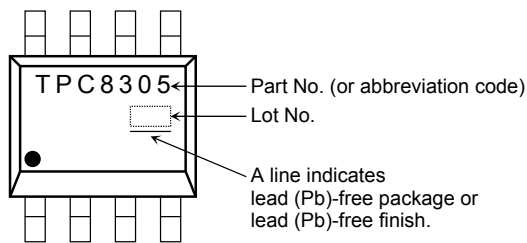
Circuit Configuration



Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10s) (Note 2a)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	83.3	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	125	
Thermal resistance, channel to ambient (t = 10s) (Note 2b)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	167	
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	278	

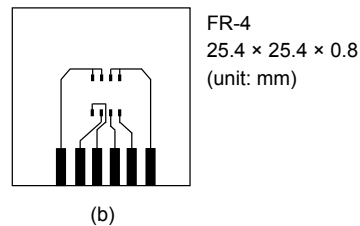
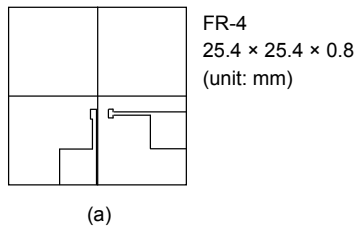
Marking (Note 6)



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

Note 2:

- a) Device mounted on a glass-epoxy board (a) b) Device mounted on a glass-epoxy board (b)



Note 3:

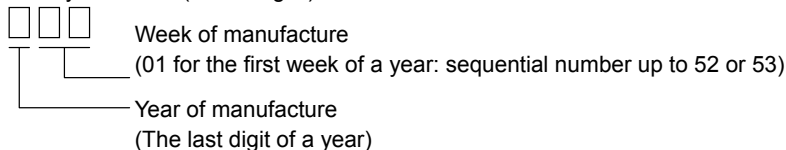
- a) The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.)
- b) The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.)

Note 4: $V_{DD} = -16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -5\text{ A}$

Note 5: Repetitive rating: pulse width limited by maximum channel temperature

Note 6: ● on lower left of the marking indicates Pin 1.

※ Weekly code: (Three digits)

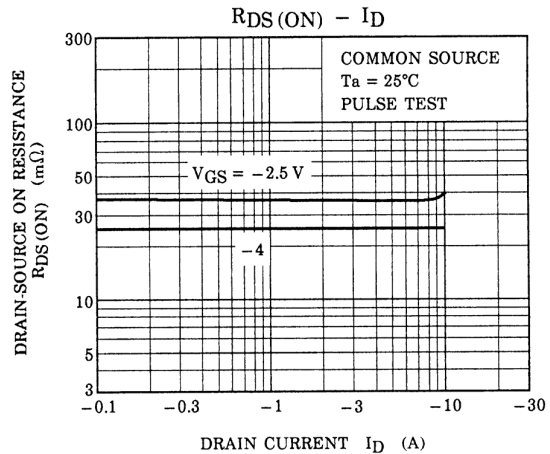
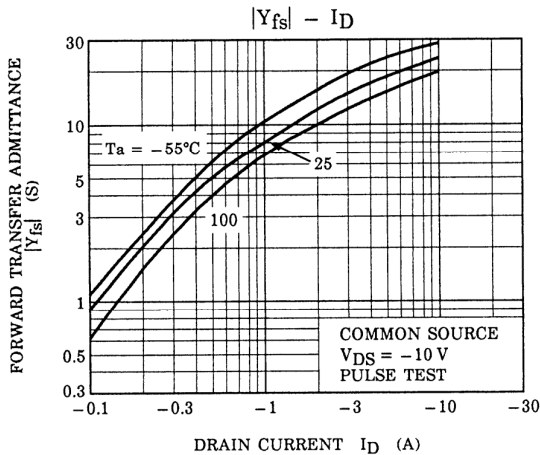
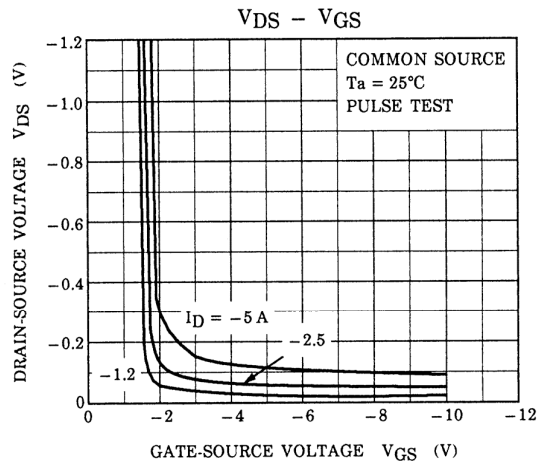
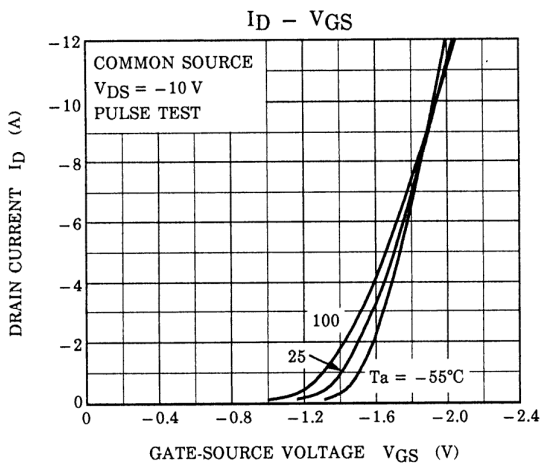
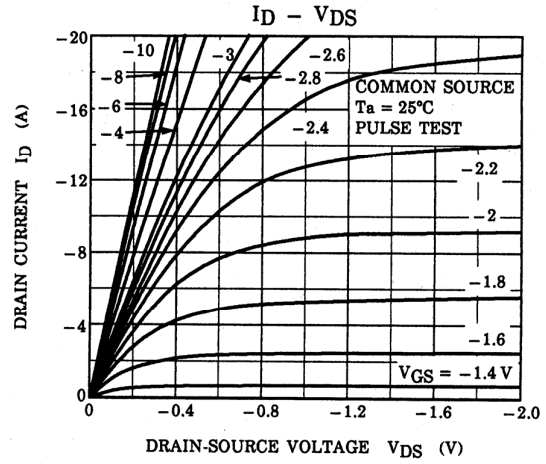
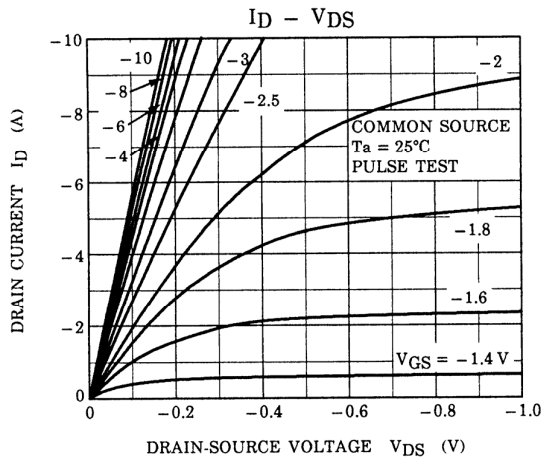


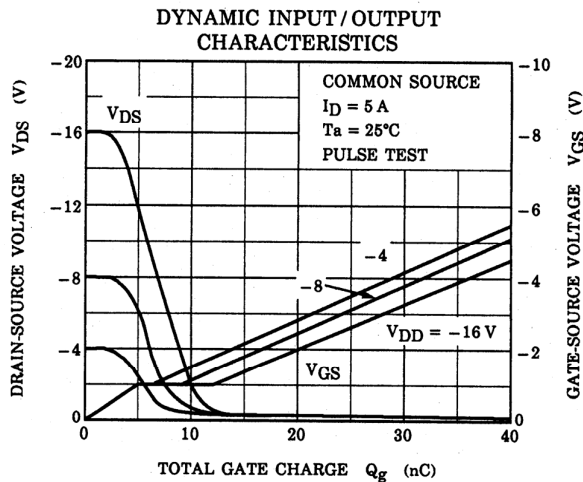
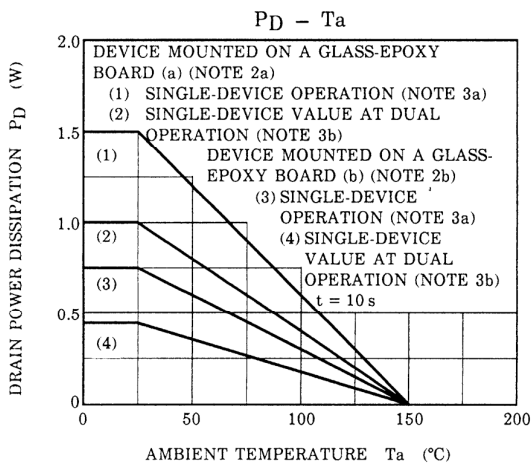
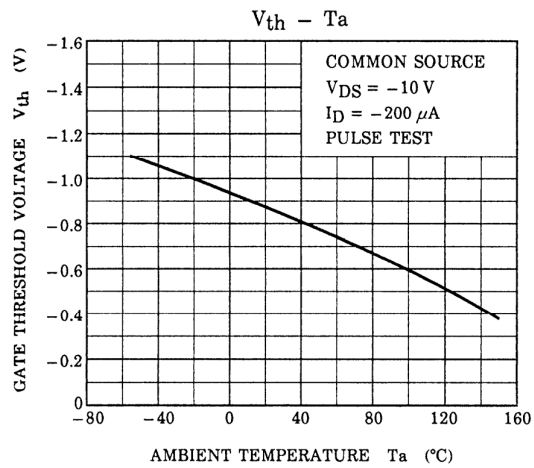
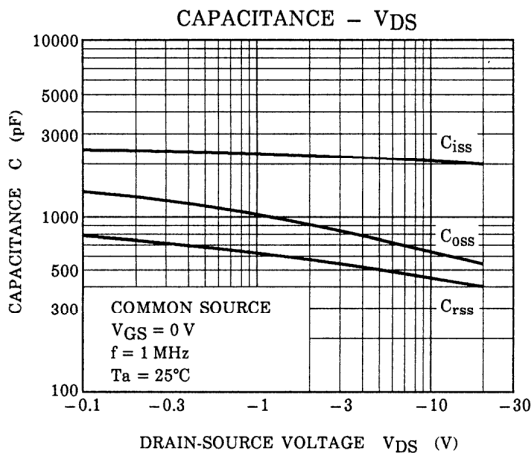
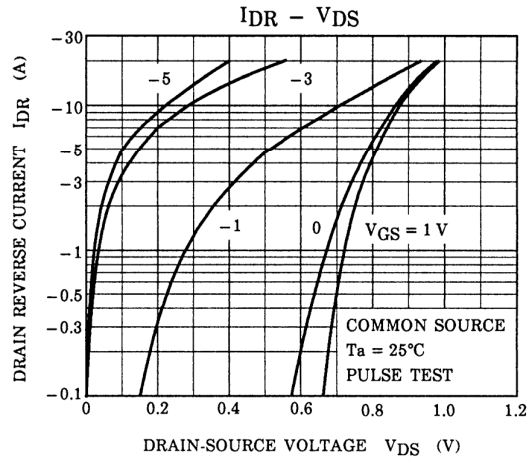
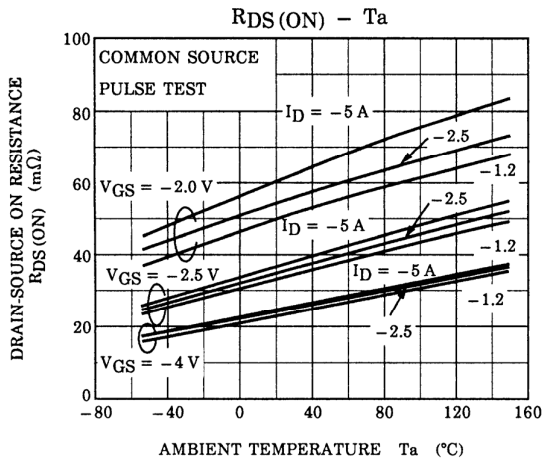
Electrical Characteristics (Ta = 25°C)

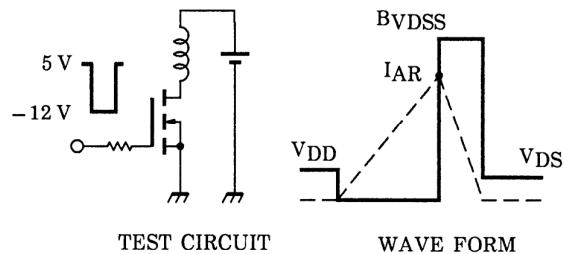
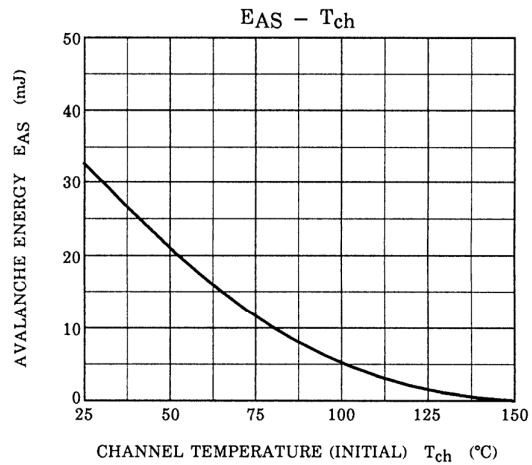
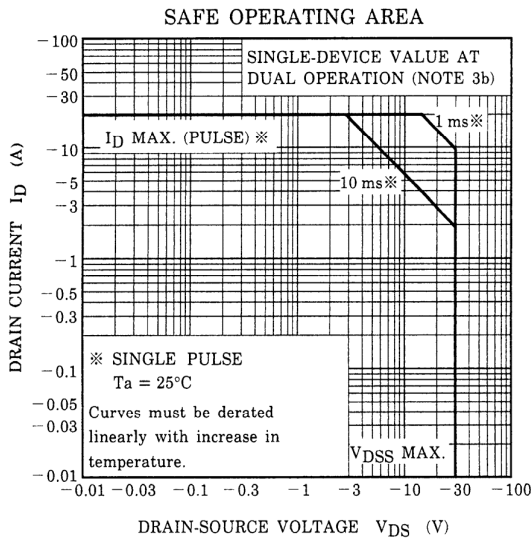
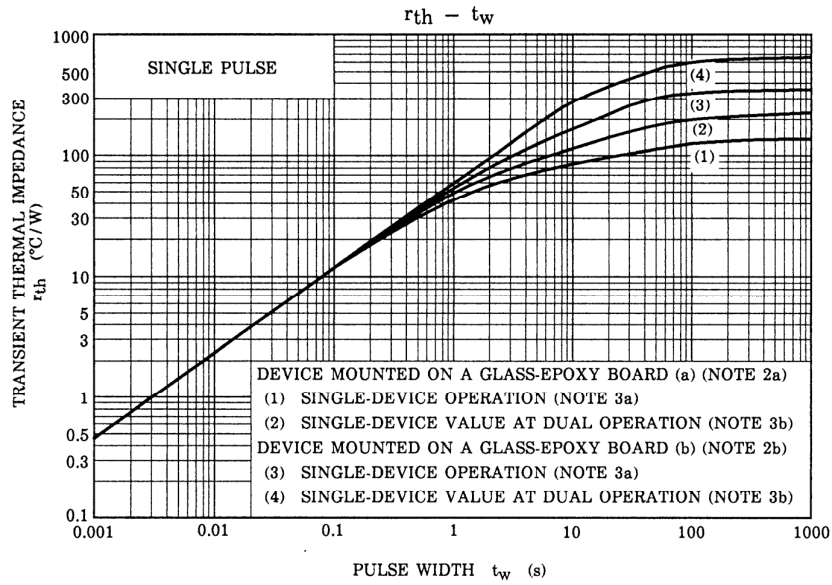
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-20	—	—	V
			$I_D = -10\text{ mA}, V_{GS} = 12\text{ V}$	-8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -200\text{ }\mu\text{A}$	-0.5	—	-1.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -2.0\text{ V}, I_D = -2.5\text{ A}$	—	56	80	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = -2.5\text{ V}, I_D = -2.5\text{ A}$	—	38	50	$\text{m}\Omega$
		$R_{DS(ON)}$	$V_{GS} = -4.5\text{ V}, I_D = -2.5\text{ A}$	—	24	30	$\text{m}\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -2.5\text{ A}$	6	12	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	2030	—	pF
Reverse transfer capacitance		C_{rss}		—	400	—	
Output capacitance		C_{oss}		—	580	—	
Switching time	Rise time	t_r	<p>$V_{GS} = 0\text{ V}$ $V_{GS} = -5\text{ V}$ $I_D = -2.5\text{ A}$ $R_L = 4\text{ }\Omega$ $V_{DD} \approx -10\text{ V}$ Duty $\leq 1\%$, $t_w = 10\text{ }\mu\text{s}$</p>	—	25	—	ns
	Turn-ON time	t_{on}		—	35	—	
	Fall time	t_f		—	95	—	
	Turn-OFF time	t_{off}		—	200	—	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16\text{ V}, V_{GS} = -5\text{ V}, I_D = -5\text{ A}$	—	24	—	nC
Gate-source charge		Q_{gs}		—	17	—	
Gate-drain ("miller") charge		Q_{gd}		—	7	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-20	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -5\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







$T_{ch} = 25^\circ\text{C}$ (Initial)
 Peak $I_{AR} = -5\text{ A}$, $R_G = 25\ \Omega$
 $V_{DD} = -16\text{ V}$, $L = 1.0\text{ mH}$

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

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