

# TPC8041

Lithium Ion Battery Applications  
 Portable Equipment Applications  
 Notebook PC Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance:  $R_{DS(ON)} = 5.5\text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 26\text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 10\text{ }\mu\text{A}$  (max) ( $V_{DS} = 30\text{ V}$ )
- Enhancement mode:  $V_{th} = 1.3\text{ to }2.5\text{ V}$  ( $V_{DS} = 10\text{ V}$ ,  $I_D = 1\text{ mA}$ )

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

Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	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 (Note 1)	$I_D$	13	A
	Pulse (Note 1)	$I_{DP}$	52	
Drain power dissipation	( $t = 10\text{ s}$ ) (Note 2a)	$P_D$	1.9	W
Drain power dissipation	( $t = 10\text{ s}$ ) (Note 2b)	$P_D$	1.0	W
Single pulse avalanche energy (Note 3)		$E_{AS}$	44	mJ
Avalanche current		$I_{AR}$	13	A
Repetitive avalanche energy (Note 2a) (Note 4)		$E_{AR}$	0.066	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

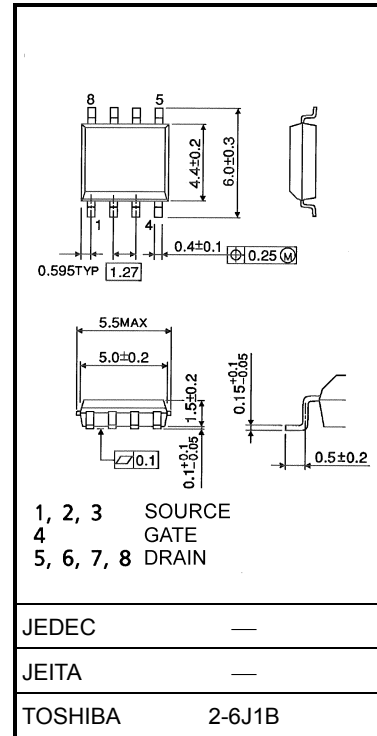
Note 1, Note 2, Note 3 and Note 4: See the next page.

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).

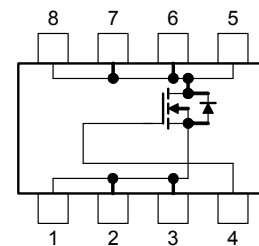
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.08 g (typ.)

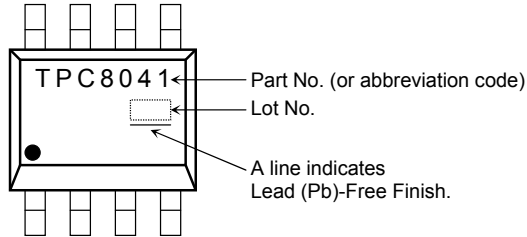
### Circuit Configuration



## Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th(ch-a)}$	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th(ch-a)}$	125	°C/W

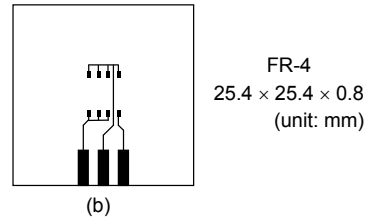
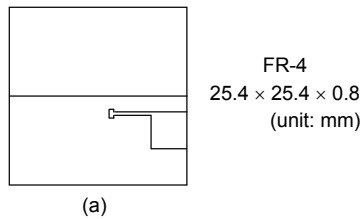
## Marking (Note 5)



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)

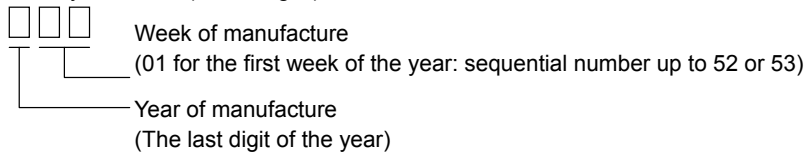


Note 3:  $V_{DD} = 24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.2\text{ mH}$ ,  $I_{AR} = 13\text{ A}$

Note 4: Repetitive rating: pulse width limited by max channel temperature

Note 5: • on lower left of the marking indicates Pin 1.

※ Weekly code: (Three digits)

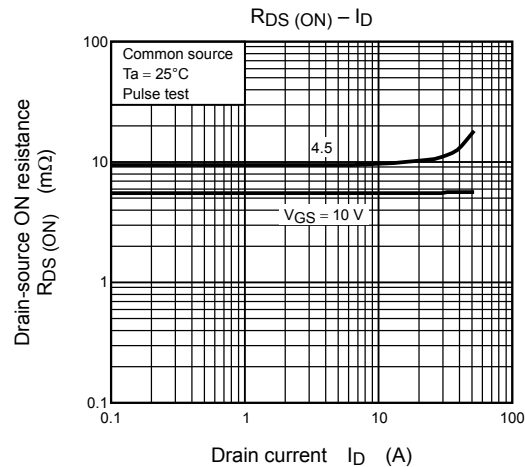
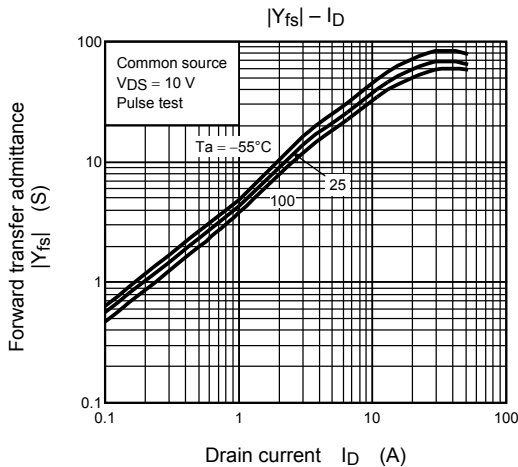
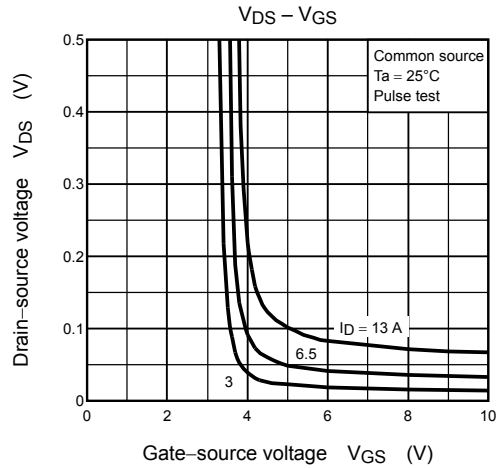
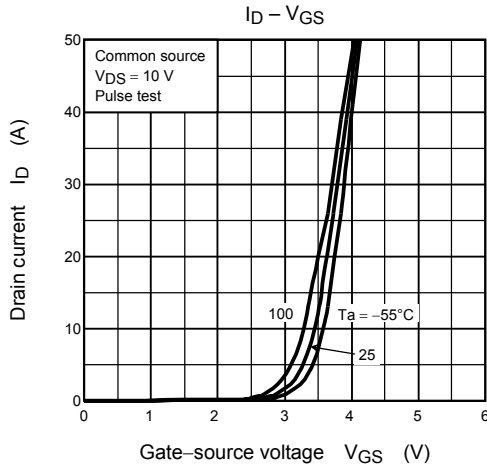
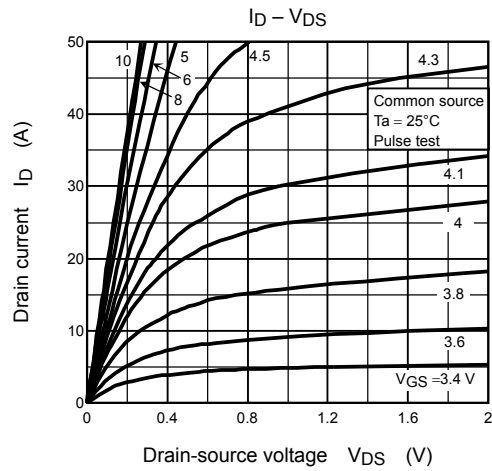
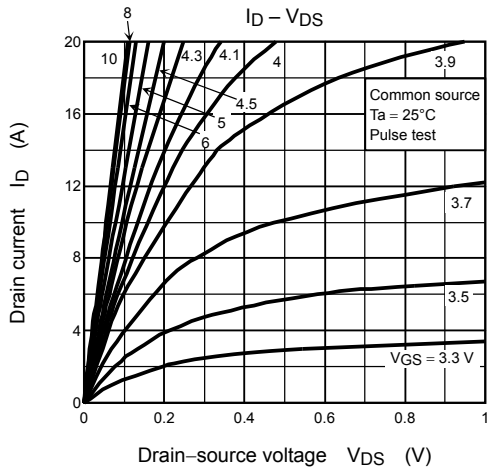


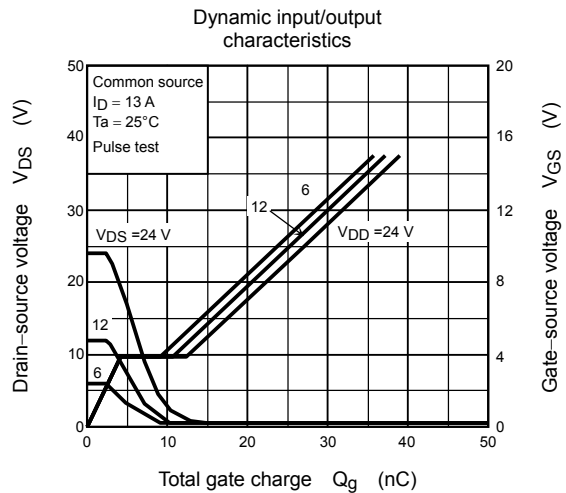
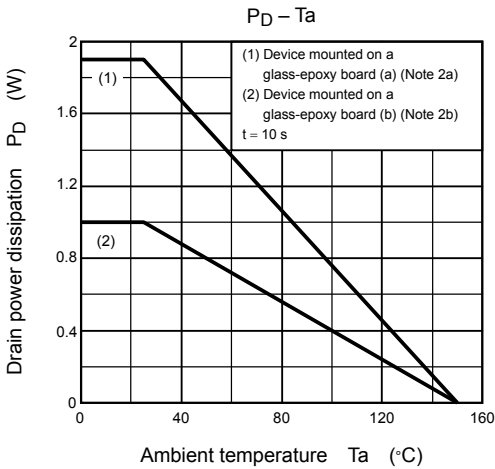
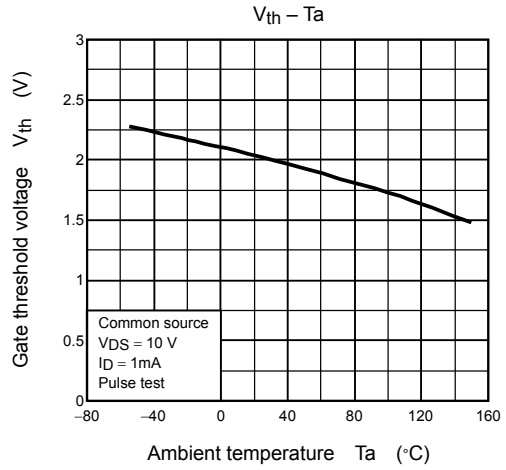
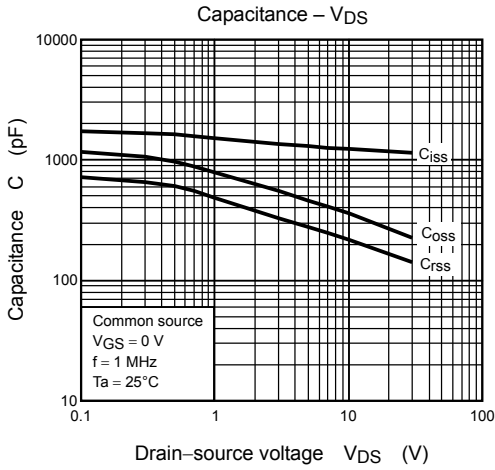
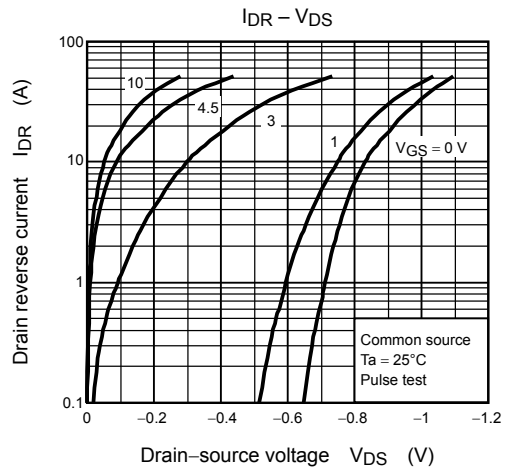
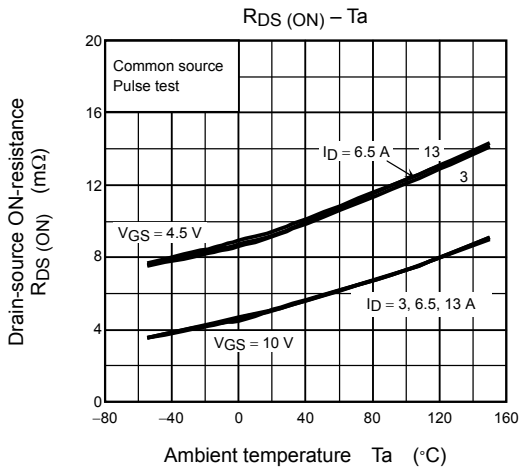
## Electrical Characteristics (Ta = 25°C)

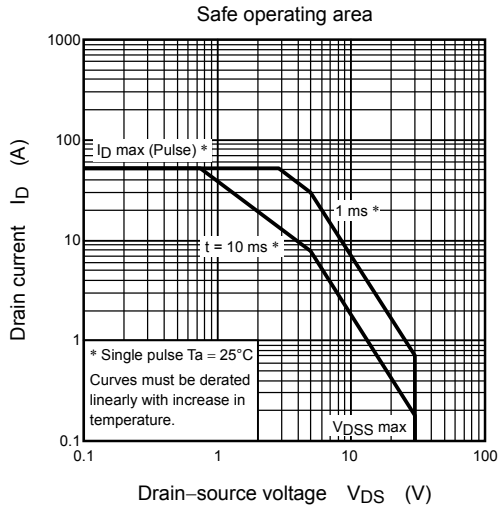
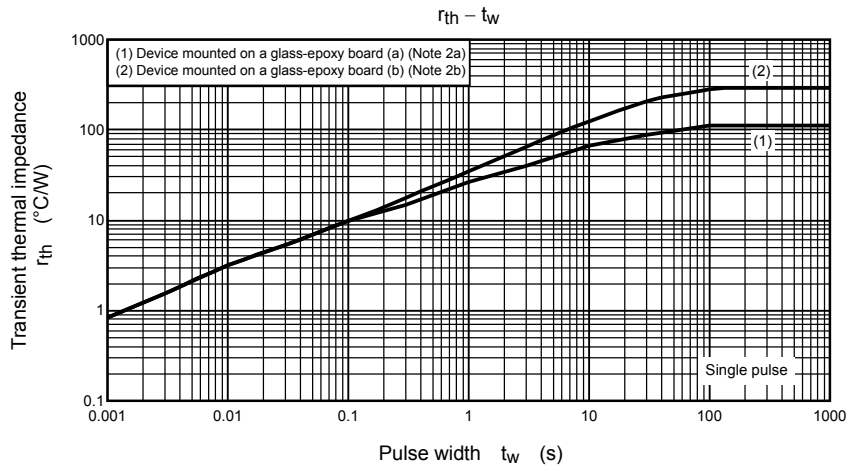
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 100$	nA
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 30\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	30	—	—	V
		$V_{(BR) DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	10	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 1\text{ mA}$	1.3	—	2.5	V
Drain-source ON-resistance		$R_{DS(ON)}$	$V_{GS} = 4.5\text{ V}, I_D = 6.5\text{ A}$	—	9	13.5	m $\Omega$
			$V_{GS} = 10\text{ V}, I_D = 6.5\text{ A}$	—	5.5	7	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 6.5\text{ A}$	13	26	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1270	—	pF
Reverse transfer capacitance		$C_{rss}$		—	240	—	
Output capacitance		$C_{oss}$		—	380	—	
Switching time	Rise time	$t_r$	<p><math>V_{GS} = 10\text{ V}</math> <math>0\text{ V}</math> <math>I_D = 6.5\text{ A}</math> <math>V_{OUT}</math> <math>4.7\ \Omega</math> <math>2.3\ \Omega</math> <math>V_{DD} \approx 15\text{ V}</math> Duty <math>\leq 1\%</math>, <math>t_w = 10\ \mu\text{s}</math></p>	—	11	—	ns
	Turn-ON time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	15	—	
	Turn-OFF time	$t_{off}$		—	39	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 24\text{ V}, V_{GS} = 10\text{ V}, I_D = 13\text{ A}$	—	27	—	nC
Gate-source charge 1		$Q_{gs1}$		—	4.2	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	8.2	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	52	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = 13\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.2	V







## RESTRICTIONS ON PRODUCT USE

20070701-EN GENERAL

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