

# TPCS8201

Lithium Ion Battery Applications  
 Portable Equipment Applications  
 Notebook PCs

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 22 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 13 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = 10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = 20 \text{ V}$ )
- Enhancement mode:  $V_{th} = 0.5 \sim 1.2 \text{ V}$  ( $V_{DS} = 10 \text{ V}$ ,  $I_D = 200 \text{ }\mu\text{A}$ )

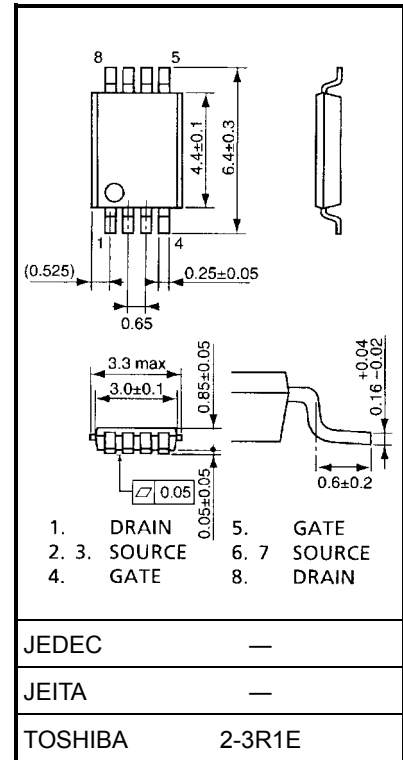
## Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

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		$V_{GSS}$	$\pm 12$	V
Drain current	D C (Note 1)	$I_D$	5	A
	Pulse (Note 1)	$I_{DP}$	20	
Drain power dissipation ( $t = 10\text{s}$ ) (Note 2a)	Single-device operation (Note 3a)	$P_{D(1)}$	1.1	W
	Single-device value at dual operation (Note 3b)	$P_{D(2)}$	0.75	
Drain power dissipation ( $t = 10\text{s}$ ) (Note 2b)	Single-device operation (Note 3a)	$P_{D(1)}$	0.6	W
	Single-device value at dual operation (Note 3b)	$P_{D(2)}$	0.35	
Single pulse avalanche energy (Note 4)		$E_{AS}$	32.5	mJ
Avalanche current		$I_{AR}$	5	A
Repetitive avalanche energy Single-device value at operation (Note 2a, Note 3b, Note 5)		$E_{AR}$	0.075	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55~150	$^\circ\text{C}$

Note: For (Note 1), (Note 2a), (Note 2b), (Note 3a), (Note 3b), (Note 4) and (Note 5) please refer to the next page.

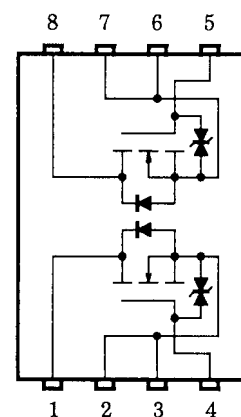
This transistor is an electrostatic sensitive device. Please handle with caution.

Unit: mm



Weight: 0.035 g (typ.)

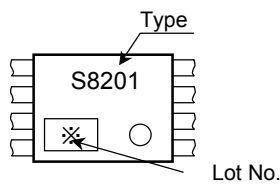
## Circuit Configuration



## Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10s)	Single-device operation (Note 3a)	R <sub>th (ch-a)</sub> (1)	114	°C/W
	Single-device value at dual operation (Note 3b)	R <sub>th (ch-a)</sub> (2)	167	
Thermal resistance, channel to ambient (t = 10s)	Single-device operation (Note 3a)	R <sub>th (ch-a)</sub> (1)	208	
	Single-device value at dual operation (Note 3b)	R <sub>th (ch-a)</sub> (2)	357	

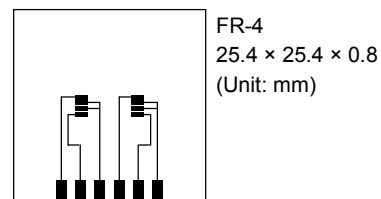
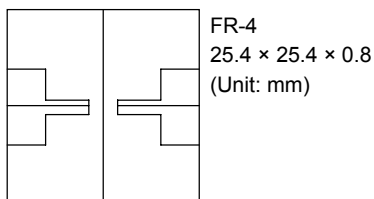
## Marking (Note 6)



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

Note 2:

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



Note 3:

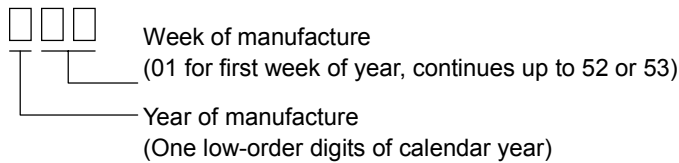
- a) The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.).
- b) The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both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

Note 4: V<sub>DD</sub> = 16 V, T<sub>ch</sub> = 25°C (Initial), L = 1.0 mH, R<sub>G</sub> = 25 Ω, I<sub>AR</sub> = 5.0 A

Note 5: Repetitive rating; pulse width limited by max channel temperature.

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

※ Weekly code: (Three digits)

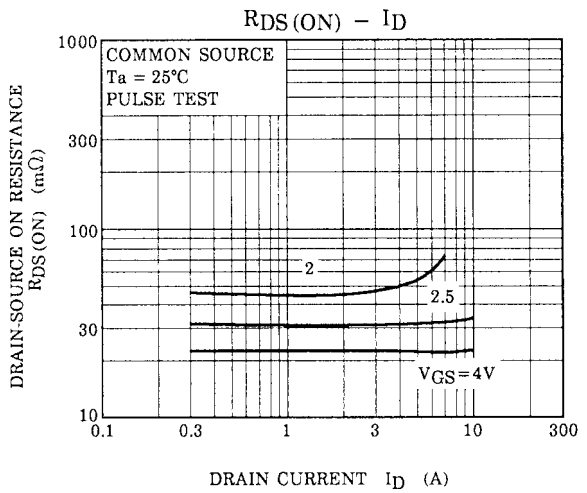
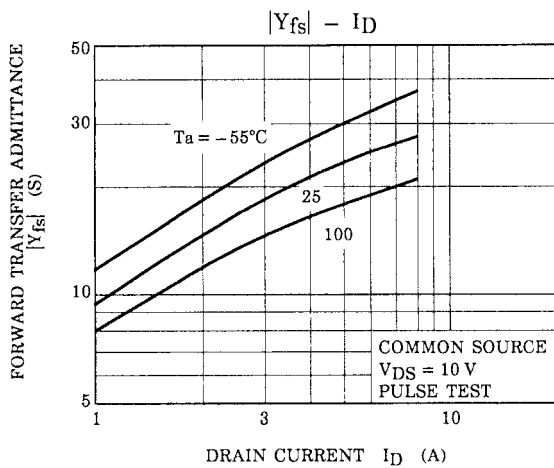
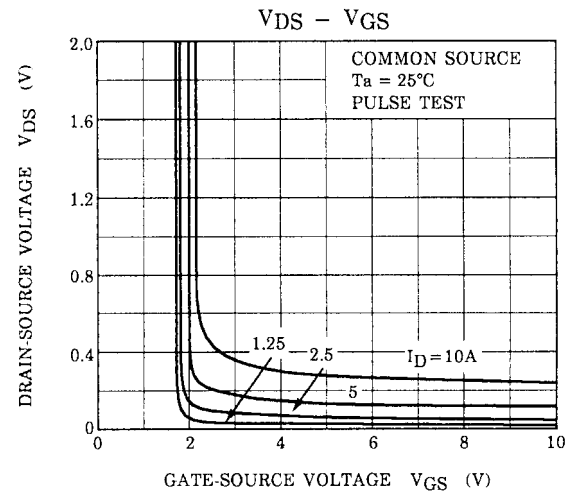
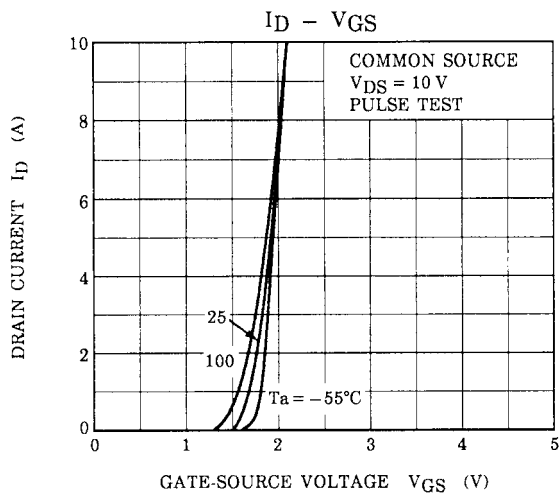
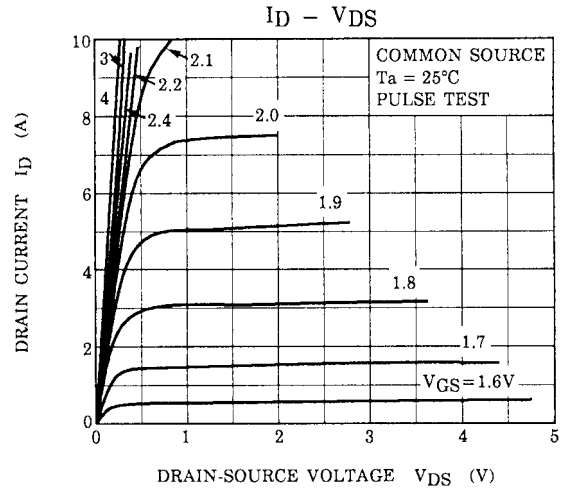
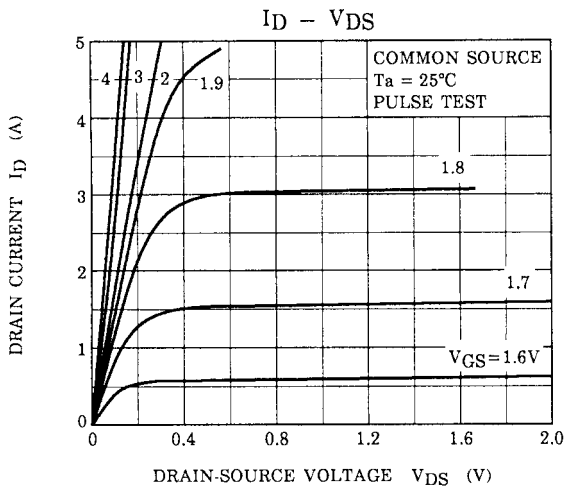


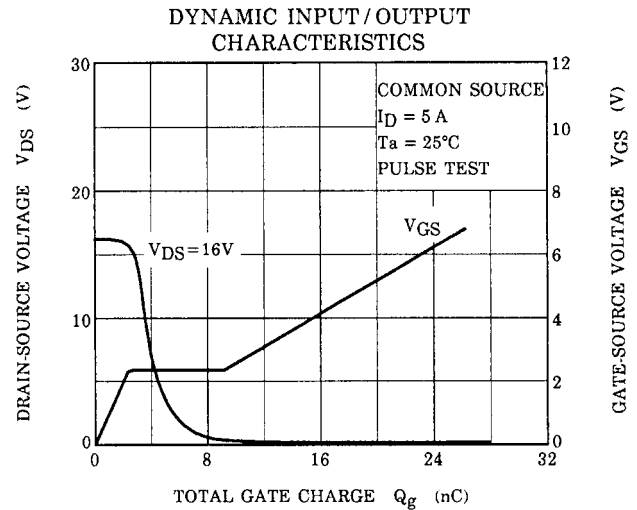
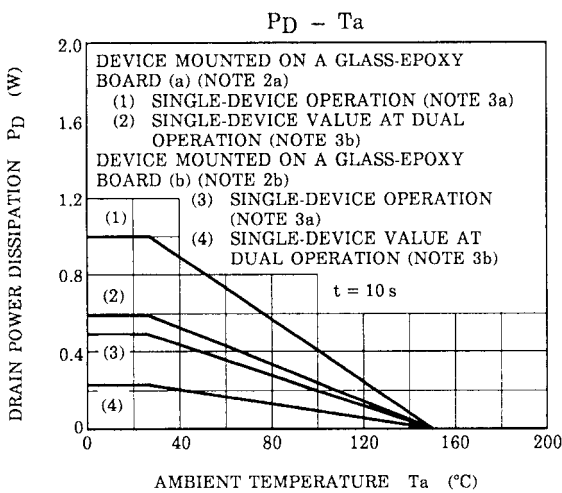
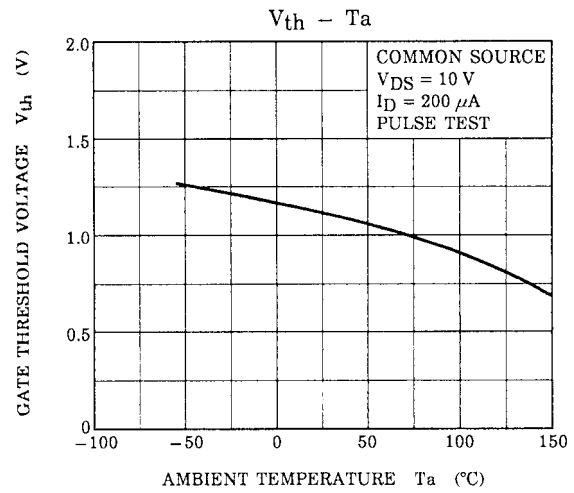
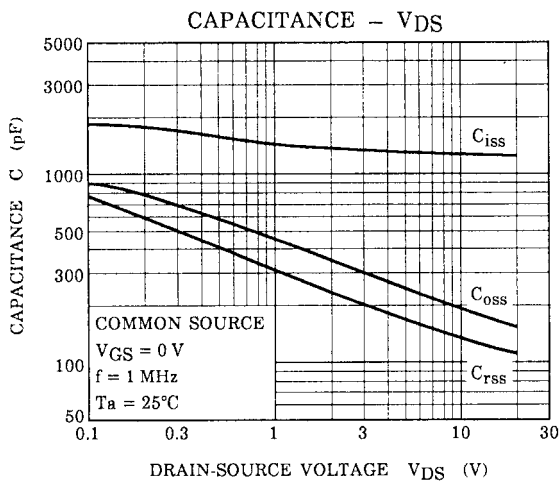
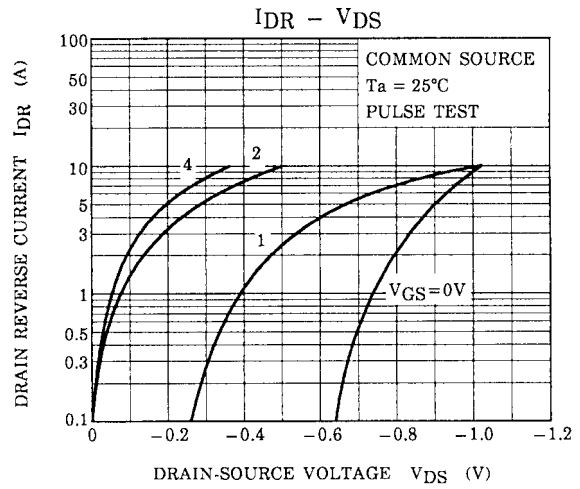
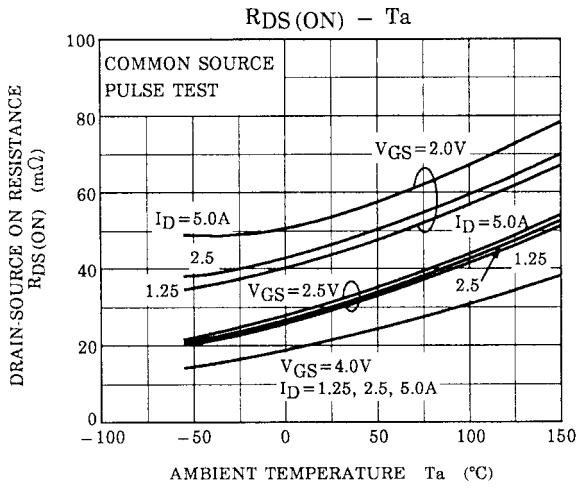
## Electrical Characteristics (Ta = 25°C)

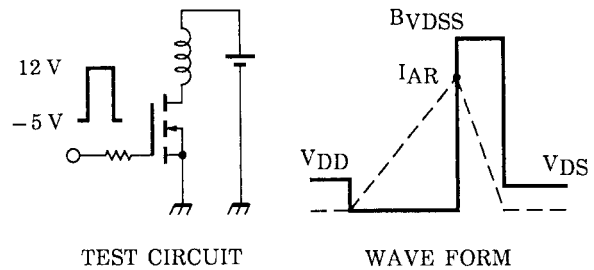
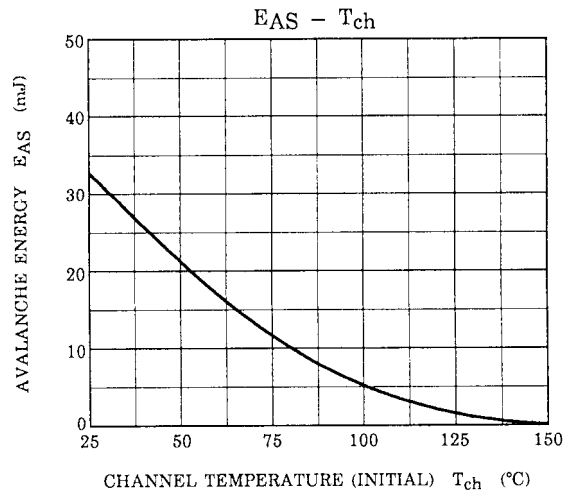
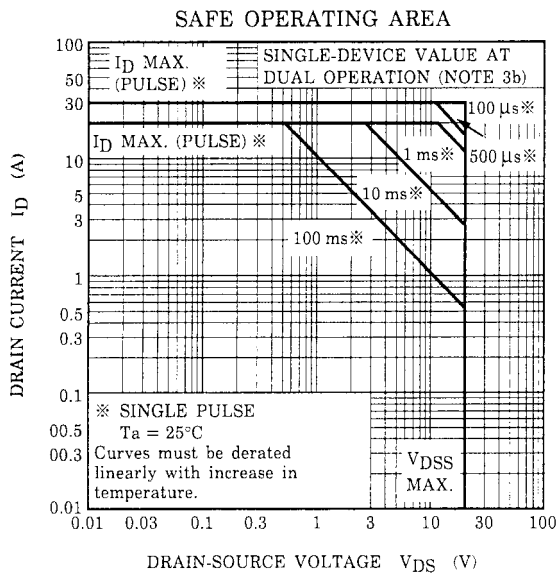
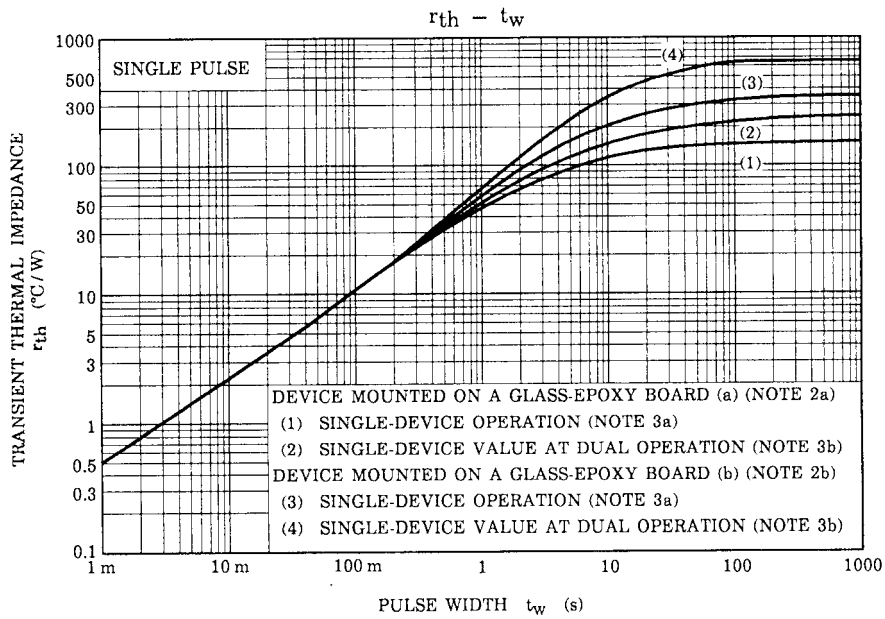
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	20	—	—	V
		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -12\text{ V}$	15	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = 10\text{ V}, I_D = 200\ \mu\text{A}$	0.5	—	1.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 2.0\text{ V}, I_D = 3.5\text{ A}$	—	48	60	m $\Omega$
		$R_{DS(ON)}$	$V_{GS} = 2.5\text{ V}, I_D = 3.5\text{ A}$	—	31	40	
		$R_{DS(ON)}$	$V_{GS} = 4\text{ V}, I_D = 4\text{ A}$	—	22	30	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = 10\text{ V}, I_D = 2.5\text{ A}$	5	13	—	S
Input capacitance		$C_{iss}$	$V_{DS} = 10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	1350	—	pF
Reverse transfer capacitance		$C_{rss}$		—	140	—	pF
Output capacitance		$C_{oss}$		—	200	—	pF
Switching time	Rise time	$t_r$	<p> <math>I_D = 2.5\text{ A}</math>  <math>V_{GS} = 5\text{ V}</math>  <math>0\text{ V}</math>  <math>4.7\text{ nF}</math>  <math>R_L = 4\ \Omega</math>  <math>V_{DD} \approx 10\text{ V}</math>  <math>\text{Duty} \leq 1\%, t_w = 10\ \mu\text{s}</math> </p>	—	4	—	ns
	Turn-ON time	$t_{on}$		—	14	—	
	Fall time	$t_f$		—	15	—	
	Turn-OFF time	$t_{off}$		—	65	—	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx 16\text{ V}, V_{GS} = 5\text{ V}, I_D = 5\text{ A}$	—	18	—	nC
Gate-source charge		$Q_{gs}$		—	12	—	nC
Gate-drain ("miller") charge		$Q_{gd}$		—	6	—	nC

## 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  $I_{AR} = 5\text{ A}$ ,  $R_G = 25\ \Omega$   $EAS = \frac{1}{2} \cdot L \cdot I^2 \cdot \left( \frac{BVDSS}{BVDSS - V_{DD}} \right)$   
 $V_{DD} = 16\text{ V}$ ,  $L = 1.0\text{ mH}$

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