

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (U-MOSVI-H)

## TPC8060-H

High Efficiency DC-DC Converter Applications

Notebook PC Applications

Portable Equipment Applications

- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge:  $Q_{SW} = 16 \text{ nC (typ.)}$
- Low drain-source ON-resistance:  
 $R_{DS(ON)} = 3.1 \text{ m}\Omega \text{ (typ.) (} V_{GS} = 4.5 \text{ V)}$
- High forward transfer admittance:  $|Y_{fs}| = 63 \text{ S (typ.)}$
- Low leakage current:  $I_{DSS} = 10 \text{ }\mu\text{A (max) (} V_{DS} = 30 \text{ V)}$
- Enhancement mode:  $V_{th} = 1.3 \text{ to } 2.3 \text{ V (} V_{DS} = 10 \text{ V, } I_D = 1.0 \text{ mA)}$

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

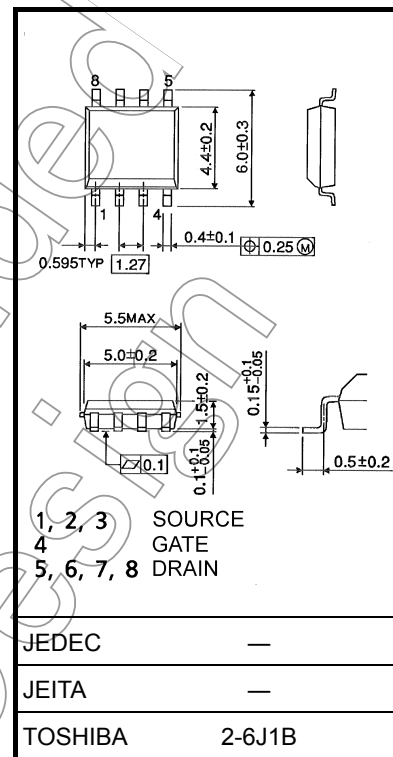
Characteristic		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	30	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	30	V
Gate-source voltage		$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	18	A
	Pulsed (Note 1)	$I_{DP}$	72	A
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)		$P_D$	1.9	W
Drain power dissipation ( $t \geq 10 \text{ s}$ ) (Note 2b)		$P_D$	1.0	W
Single pulse avalanche energy (Note 3)		$E_{AS}$	110	mJ
Avalanche current		$I_{AR}$	18	A
Repetitive avalanche energy (Note 2a) (Note 4)		$E_{AR}$	2.0	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 4, refer to 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).

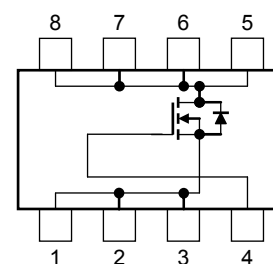
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.085 g (typ.)

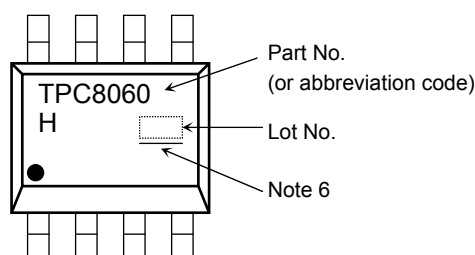
### Circuit Configuration



## Thermal Characteristics

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

## Marking (Note 5)



Note 6 : A line under a Lot No. identifies the indication of product Labels  
[[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

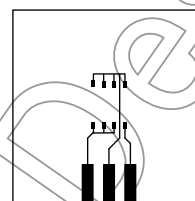
Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

Note 1: Ensure that the channel temperature does not exceed  $150^{\circ}\text{C}$ .

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)



(a)



(b)

Note 3:  $V_{DD} = 24$  V,  $T_{ch} = 25^{\circ}\text{C}$  (initial),  $L = 500$   $\mu\text{H}$ ,  $R_G = 25$   $\Omega$ ,  $I_{AR} = 18$  A

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

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

\* Weekly code: (Three digits)



Week of manufacture

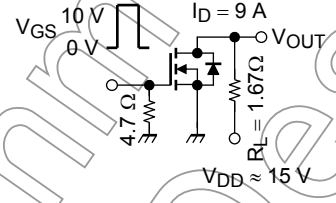
(01 for the first week of the year: sequential number up to 52 or 53)



Year of manufacture

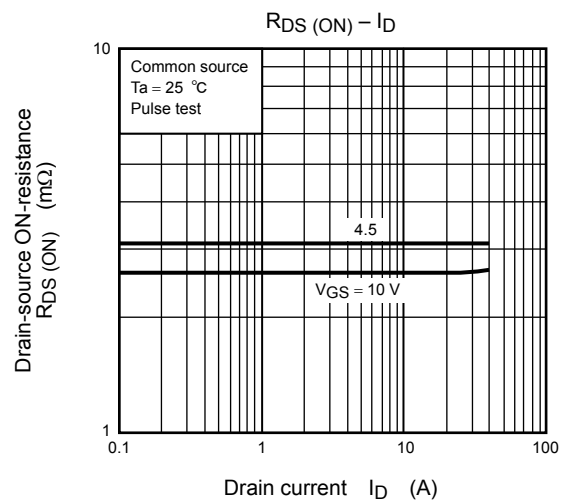
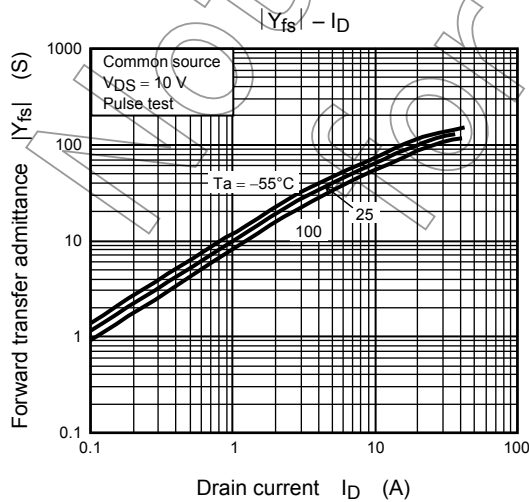
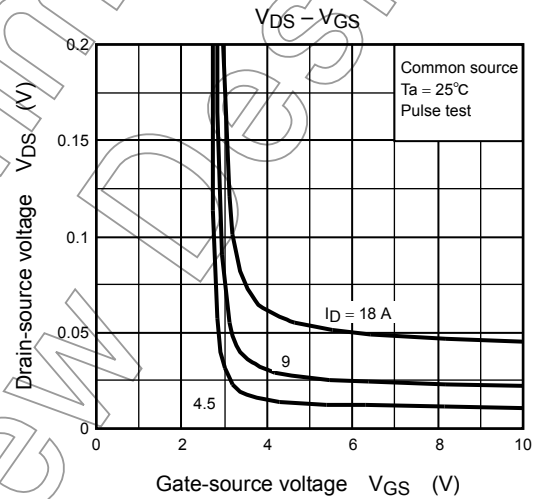
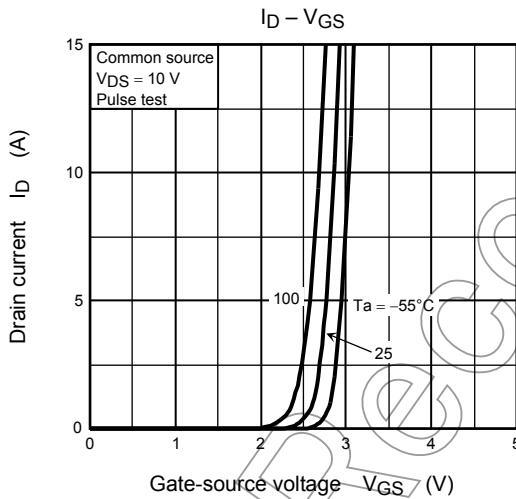
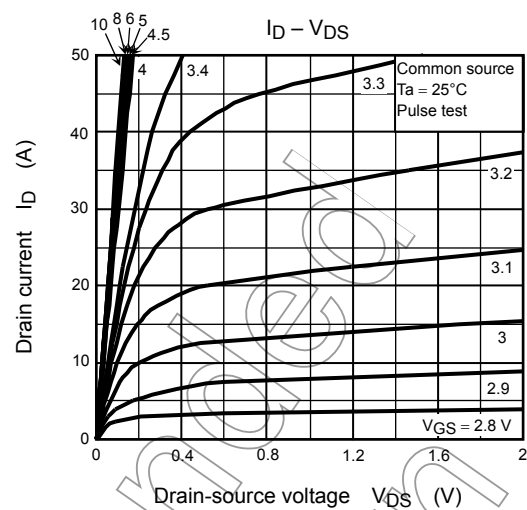
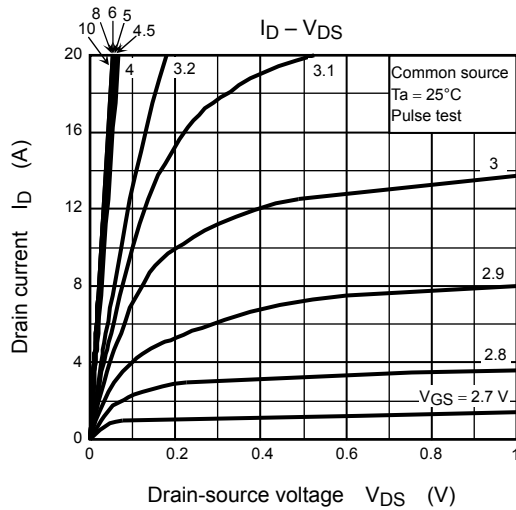
(The last digit of the year)

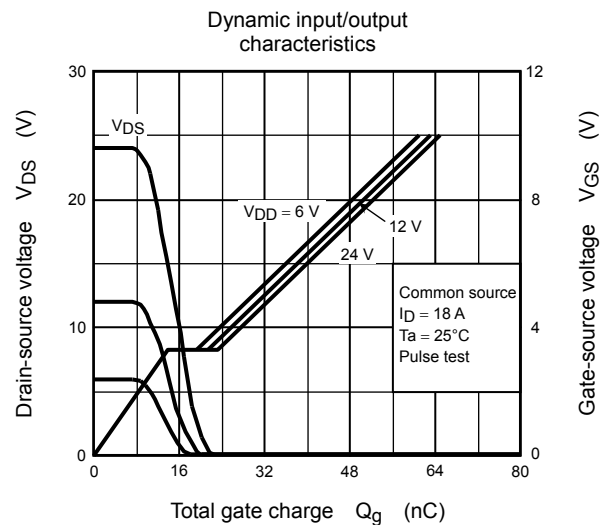
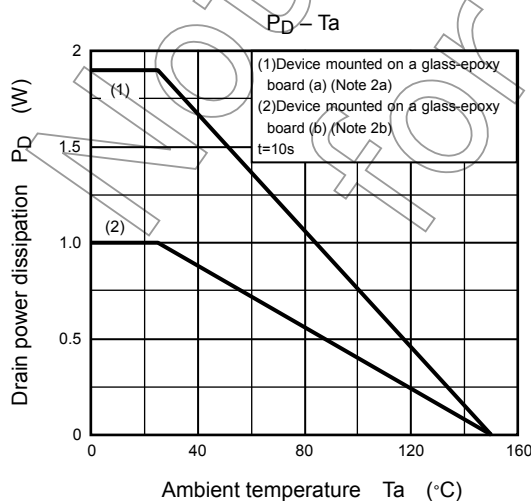
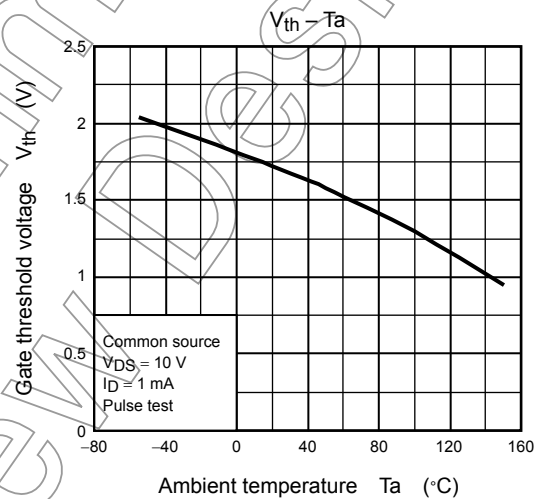
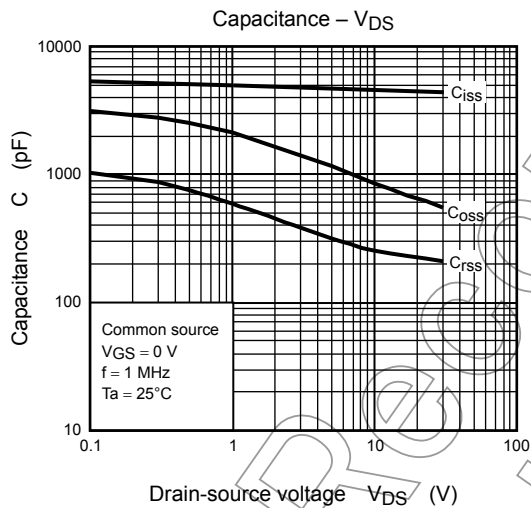
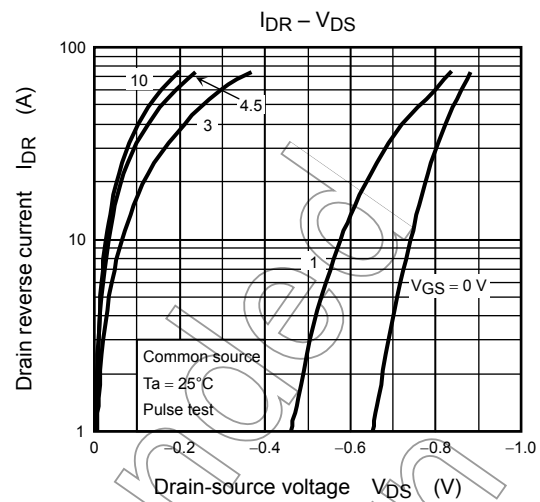
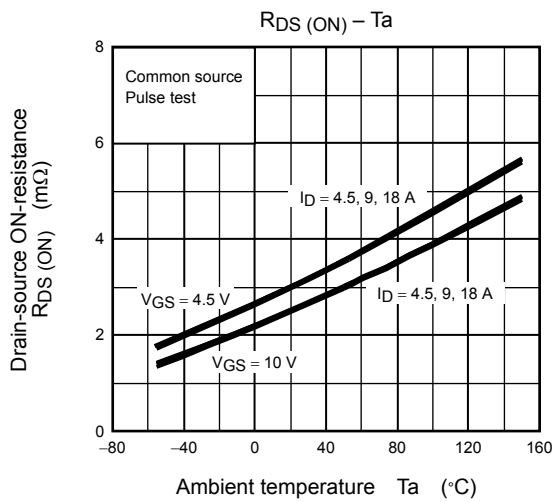
**Electrical Characteristics (Ta = 25°C)**

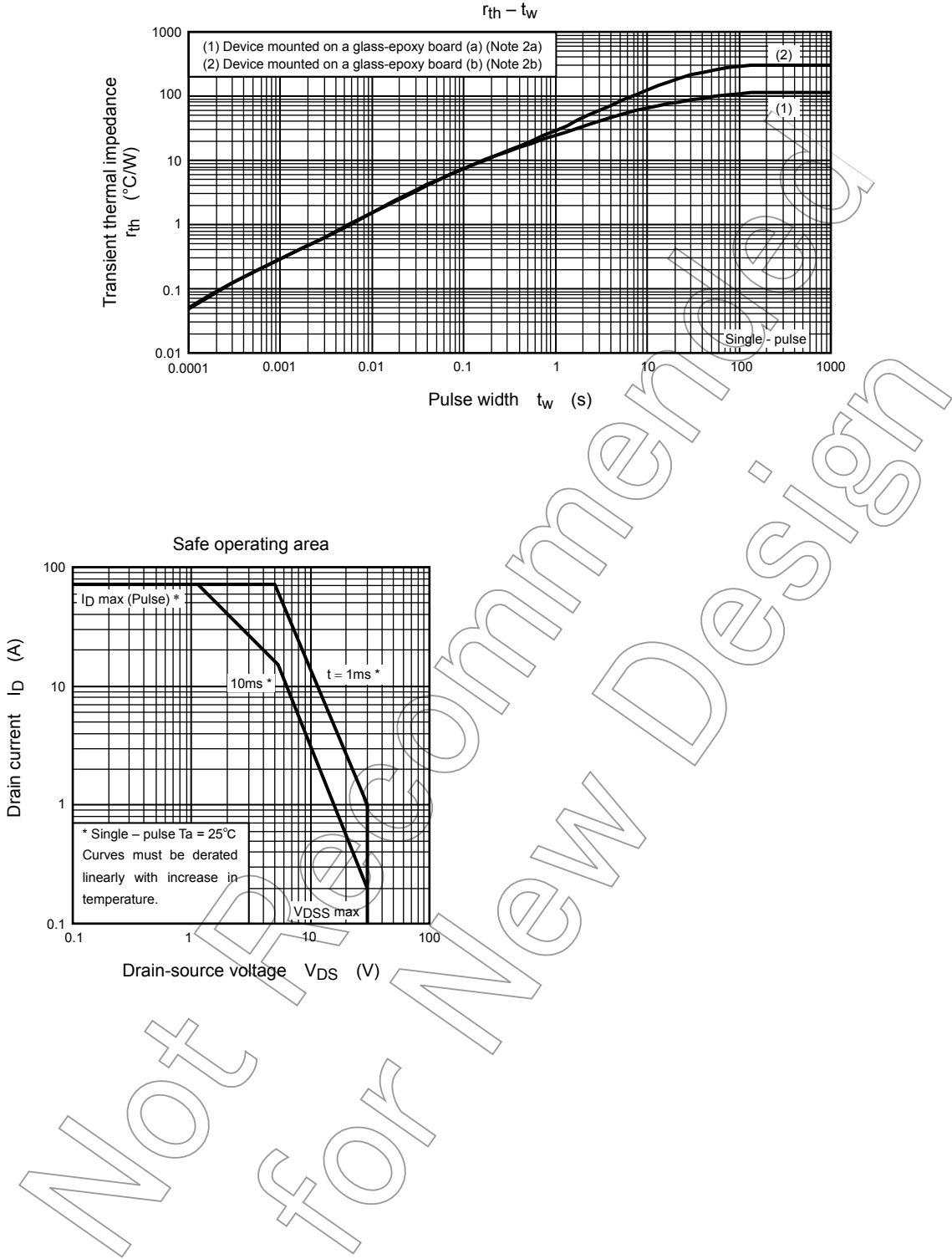
Characteristic		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I <sub>GSS</sub>	V <sub>GS</sub> = ±20 V, V <sub>DS</sub> = 0 V	—	—	±100	nA
Drain cutoff current		I <sub>DSS</sub>	V <sub>DS</sub> = 30 V, V <sub>GS</sub> = 0 V	—	—	10	μA
Drain-source breakdown voltage		V (BR) DSS	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = 0 V	30	—	—	V
		V (BR) DSX	I <sub>D</sub> = 10 mA, V <sub>GS</sub> = -20 V	15	—	—	
Gate threshold voltage		V <sub>th</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 1.0 mA	1.3	—	2.3	V
Drain-source ON-resistance		R <sub>DS (ON)</sub>	V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 9 A	—	3.1	4.2	mΩ
			V <sub>GS</sub> = 10 V, I <sub>D</sub> = 9 A	—	2.6	3.7	
Forward transfer admittance		Y <sub>fs</sub>	V <sub>DS</sub> = 10 V, I <sub>D</sub> = 9 A	32	63	—	S
Input capacitance		C <sub>iss</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	4600	6000	pF
Reverse transfer capacitance		C <sub>rss</sub>		—	290	460	
Output capacitance		C <sub>oss</sub>		—	860	—	
Gate resistance		r <sub>g</sub>	V <sub>DS</sub> = 10 V, V <sub>GS</sub> = 0 V, f = 1 MHz	—	1.0	1.5	Ω
Switching time	Rise time	t <sub>r</sub>		—	4.2	—	ns
	Turn-on time	t <sub>on</sub>		—	15	—	
	Fall time	t <sub>f</sub>		—	8.2	—	
	Turn-off time	t <sub>off</sub>		Duty ≤ 1%, t <sub>w</sub> = 10 μs	—	57	
Total gate charge (gate-source plus gate-drain)		Q <sub>g</sub>	V <sub>DD</sub> ≈ 24 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 18 A	—	65	—	nC
			V <sub>DD</sub> ≈ 24 V, V <sub>GS</sub> = 5 V, I <sub>D</sub> = 18 A	—	34	—	
Gate-source charge 1		Q <sub>gs1</sub>	V <sub>DD</sub> ≈ 24 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 18 A	—	14	—	
Gate-drain ("miller") charge		Q <sub>gd</sub>		—	9.3	—	
Gate switch charge		Q <sub>sw</sub>		—	16	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	72	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = 18 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	-1.2	V







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