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## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: info@chipsmall.com Web: www.chipsmall.com

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China





# WPB4002

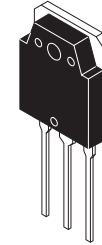
## N-Channel Power MOSFET 600V, 23A, 0.36Ω, TO-3P-3L

ON Semiconductor®

<http://onsemi.com>

### Features

- Reverse recovery time  $t_{rr}=115\text{ns}$  (typ)
- Input capacitance  $C_{iss}=2200\text{pF}$  (typ)
- ON-resistance  $R_{DS(on)}=0.28\Omega$  (typ)
- 10V drive



TO-3P-3L

### Specifications

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

Parameter	Symbol	Conditions	Ratings	Unit
Drain to Source Voltage	$V_{DSS}$		600	V
Gate to Source Voltage	$V_{GSS}$		$\pm 30$	V
Drain Current (DC)	$I_D$		23	A
Drain Current (Pulse)	$I_{DP}$	$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$	80	A
Source to Drain Diode Forward Current (DC)	$I_{SD}$		23	A
Source to Drain Diode Forward Current (Pulse)	$I_{SDP}$	$PW \leq 10\mu\text{s}$ , duty cycle $\leq 1\%$	80	A
Allowable Power Dissipation	$P_D$		2.5	W
		$T_c=25^\circ\text{C}$	220	W
Channel Temperature	$T_{ch}$		150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$		-55 to +150	$^\circ\text{C}$
Avalanche Energy (Single Pulse) *1	$E_{AS}$		157	mJ
Avalanche Current *2	$I_{AV}$		17	A

Note : \*1  $V_{DD}=50\text{V}$ ,  $L=1\text{mH}$ ,  $I_{AV}=17\text{A}$  (Fig.1)\*2  $L \leq 1\text{mH}$ , single pulse

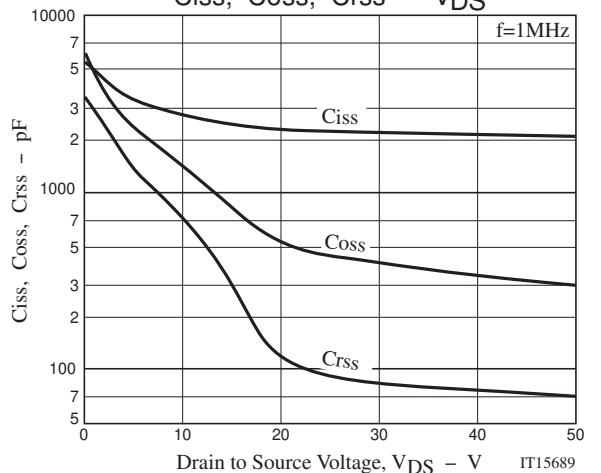
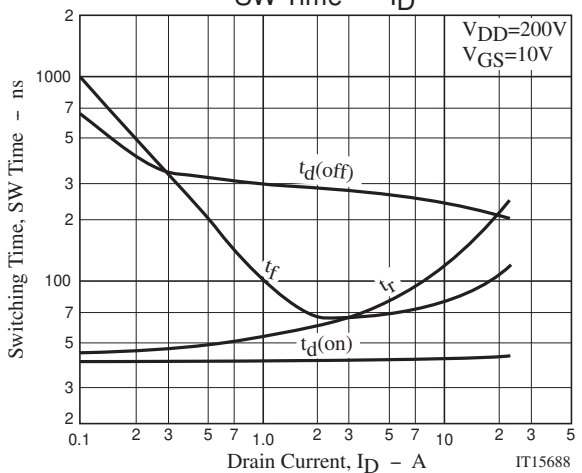
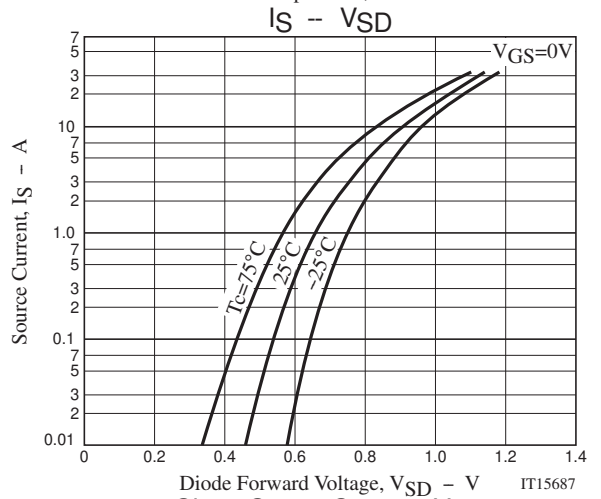
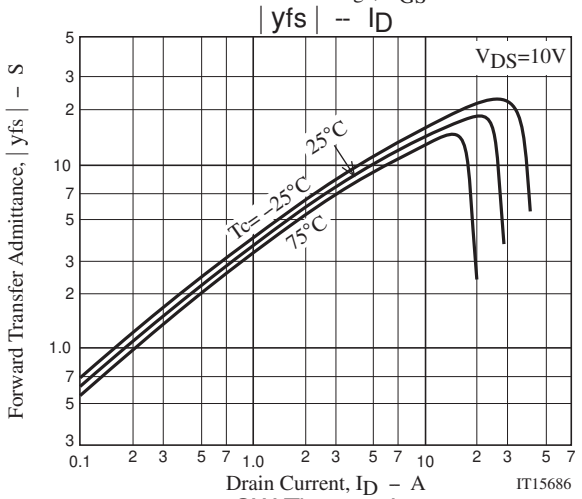
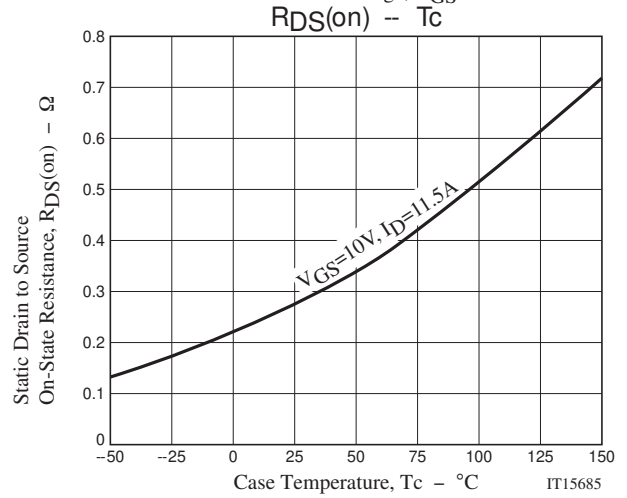
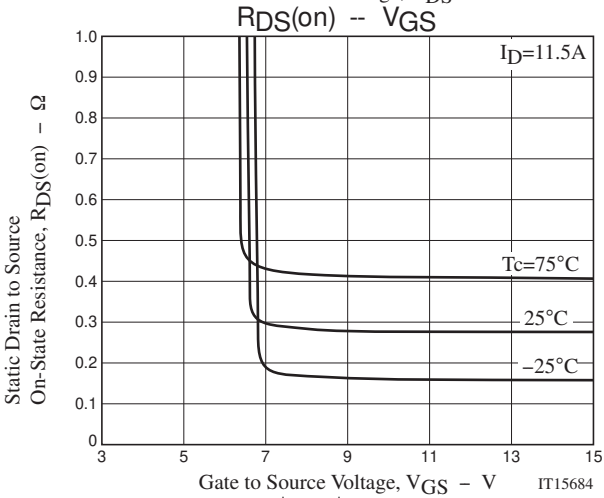
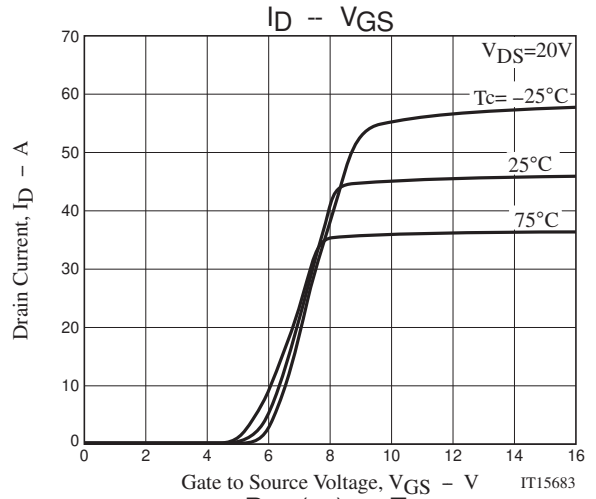
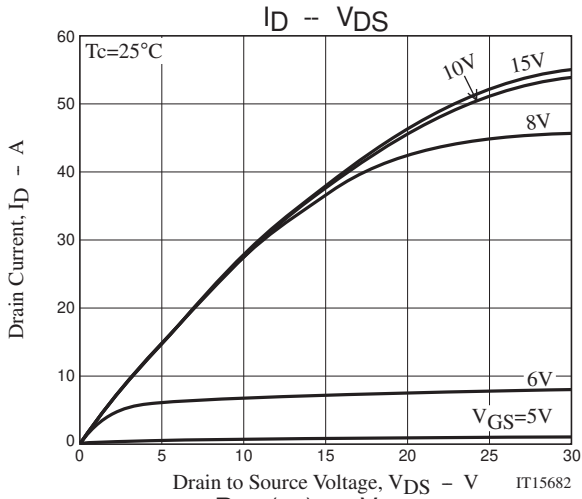
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

#### Electrical Characteristics at $T_a=25^\circ\text{C}$

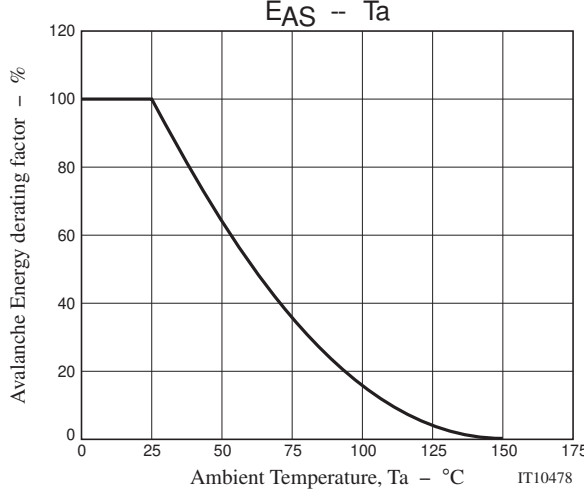
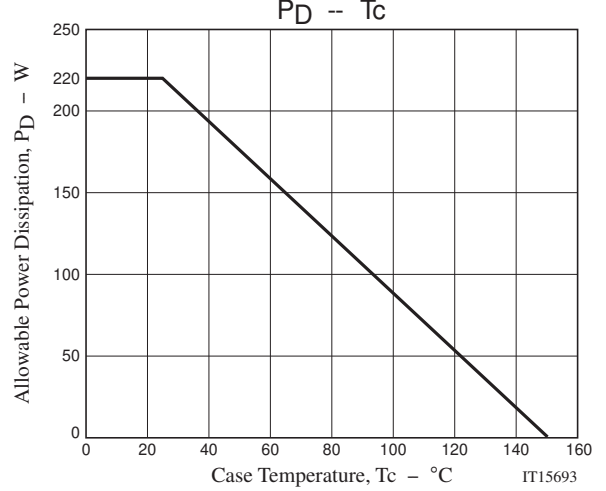
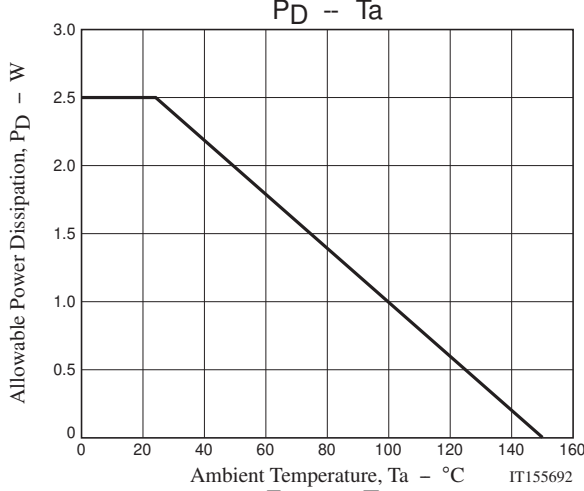
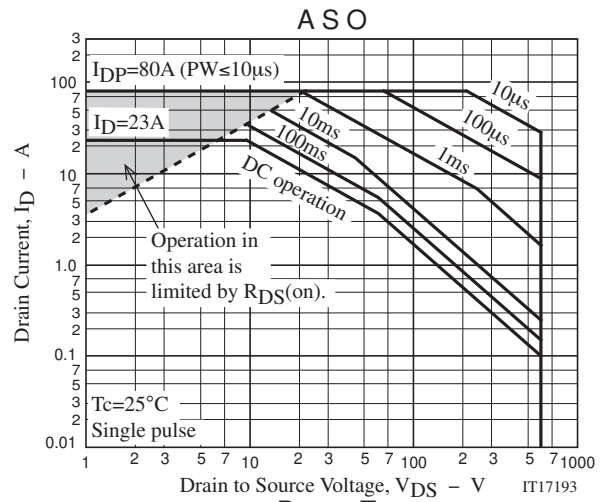
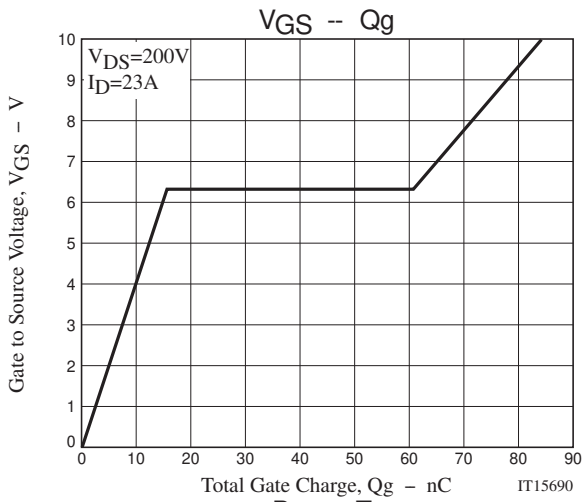
Parameter	Symbol	Conditions	Ratings			Unit	
			min	typ	max		
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D=10\text{mA}$ , $V_{GS}=0\text{V}$	600			V	
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=480\text{V}$ , $V_{GS}=0\text{V}$			100	$\mu\text{A}$	
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 30\text{V}$ , $V_{DS}=0\text{V}$			$\pm 100$	nA	
Cutoff Voltage	$V_{GS(off)}$	$V_{DS}=10\text{V}$ , $I_D=1\text{mA}$	3		5	V	
Forward Transfer Admittance	$ y_{fs} $	$V_{DS}=10\text{V}$ , $I_D=11.5\text{A}$	7.5	15		S	
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D=11.5\text{A}$ , $V_{GS}=10\text{V}$		0.28	0.36	$\Omega$	
Input Capacitance	$C_{iss}$	$V_{DS}=30\text{V}$ , $f=1\text{MHz}$		2200		pF	
Output Capacitance	$C_{oss}$				400		pF
Reverse Transfer Capacitance	$C_{rss}$				83		pF
Turn-ON Delay Time	$t_d(on)$				42		ns
Rise Time	$t_r$	See Fig.2		130		ns	
Turn-OFF Delay Time	$t_d(off)$				234		ns
Fall Time	$t_f$				84		ns
Total Gate Charge	$Q_g$	$V_{DS}=200\text{V}$ , $V_{GS}=10\text{V}$ , $I_D=23\text{A}$		84		nC	
Gate to Source Charge	$Q_{gs}$				15.2		nC
Gate to Drain "Miller" Charge	$Q_{gd}$				45.4		nC
Diode Forward Voltage	$V_{SD}$	$I_S=23\text{A}$ , $V_{GS}=0\text{V}$		1.1	1.5	V	
Reverse Recovery Time	$t_{rr}$	See Fig.3		115		ns	
Reverse Recovery Charge	$Q_{rr}$	$I_{SD}=23\text{A}$ , $V_{GS}=0\text{V}$ , $di/dt=100\text{A}/\mu\text{s}$		340		nC	

### ORDERING INFORMATION

See detailed ordering and shipping information on page 4 of this data sheet.







# WPB4002

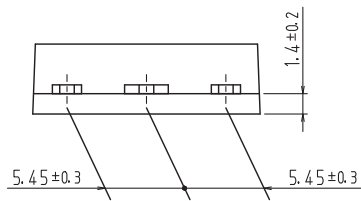
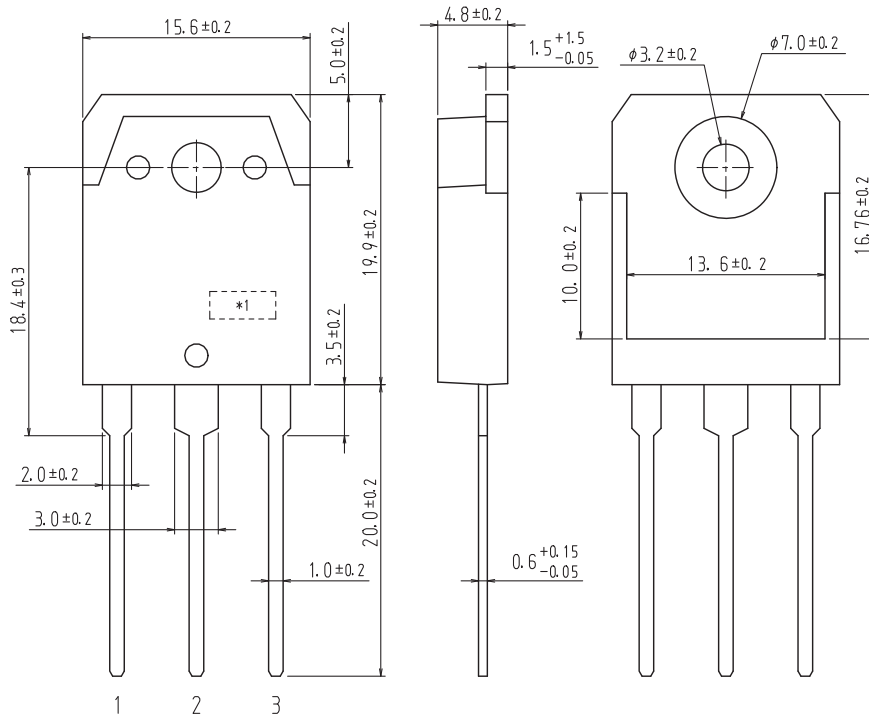
## Package Dimensions

WPB4002-1E

**TO-3P-3L**  
CASE 340AF  
ISSUE O

Unit : mm

- 1: Gate
- 2: Drain
- 3: Source



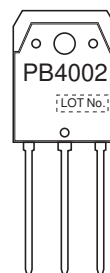
These dimension do not include mold protrusion

\*1: Lot indication

## Ordering & Package Information

Device	Package	Shipping	memo
WPB4002-1E	TO-3P-3L SC-65, SOT-199, TO-247	30 pcs./tube	Pb-Free

## Marking



## Electrical Connection

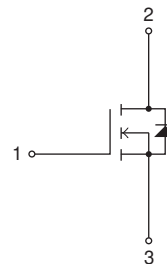


Fig.1 Unclamped Inductive Switching Test Circuit

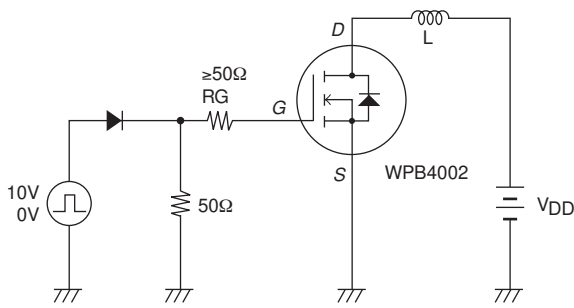


Fig.2 Switching Time Test Circuit

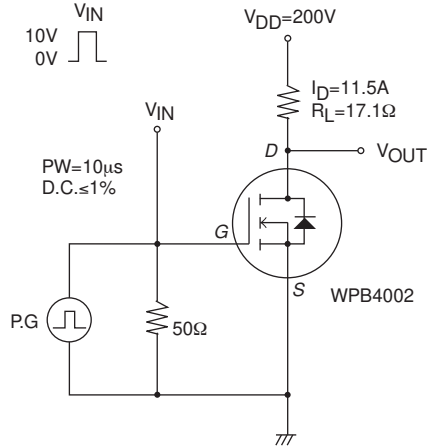
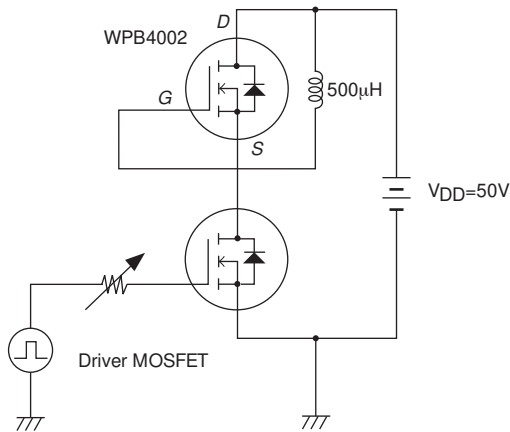


Fig.3 Reverse Recovery Resistance Test Circuit



Note on usage : Since the WPB4002 is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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