

P5506BTG-VB Datasheet N-Channel 60 V (D-S) MOSFET

PRODUCT SUMMARY					
V _{DS} (V)	I _D (A) ^a				
60	0.024 at V _{GS} = 10 V	50			
00	0.028 at V _{GS} = 4.5 V	40			

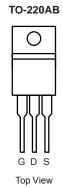
FEATURES

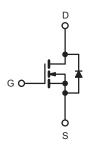
• Halogen-free According to IEC 61249-2-21 **Definition**



COMPLIANT

- Surface Mount
- Available in Tape and Reel
- Dynamic dV/dt Rating
- Logic-Level Gate Drive
- Fast Switching
- Compliant to RoHS Directive 2002/95/EC





N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)						
PARAMETER			SYMBOL	LIMIT	UNIT	
Drain-Source Voltage	V_{DS}	60	V			
Gate-Source Voltage	V_{GS}	± 20	V			
Continuous Drain Current ^f	V _{GS} at 10 V	$T_{\rm C} = 25 ^{\circ}{\rm C}$ $T_{\rm C} = 100 ^{\circ}{\rm C}$	L	50		
Continuous Drain Current	V _{GS} at 10 V	T _C = 100 °C	ID	36	Α	
Pulsed Drain Current ^a			I _{DM}	200		
Linear Derating Factor				1.0	W/°C	
Linear Derating Factor (PCB Mount)e	I	0.025	VV/ C			
Single Pulse Avalanche Energy ^b			E _{AS}	400	mJ	
Maximum Power Dissipation	T _C = 25 °C		0	150	W	
Maximum Power Dissipation (PCB Mount)e	T _A = 25 °C		P_{D}	3.7	- vv	
Peak Diode Recovery dV/dtc	dV/dt	4.5	V/ns			
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to + 175	°C			
Soldering Recommendations (Peak Temperature) ^d	emperature) ^d for 10 s			300 ^d	1 (

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11). b. $V_{DD} = 25$ V, starting $T_J = 25$ °C, L = 179 μ H, $R_g = 25$ Ω , $I_{AS} = 51$ A (see fig. 12). c. $I_{SD} \le 51$ A, $I_{AS} = 51$

- d. 1.6 mm from case.
- e. When mounted on 1" square PCB (FR-4 or G-10 material).
- f. Current limited by the package, (die current = 51 A).



THERMAL RESISTANCE RATINGS						
PARAMETER	SYMBOL	TYP.	MAX.	UNIT		
Maximum Junction-to-Ambient	R _{thJA}	-	62			
Maximum Junction-to-Ambient (PCB Mount) ^a	R _{thJA}	-	40	°C/W		
Maximum Junction-to-Case (Drain)	R _{thJC}	-	1.0			

Note
a. When mounted on 1" square PCB (FR-4 or G-10 material).

PARAMETER	SYMBOL	TES	MIN.	TYP.	MAX.	UNIT	
Static		•			ļI		
Drain-Source Breakdown Voltage	V _{DS}	V _{GS}	60	-	-	V	
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Reference	e to 25 °C, I _D = 1 mA	-	0.070	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	$V_{DS} = V_{GS}, I_{D} = 250 \mu A$		1.0	-	2.5	
Gate-Source Leakage	I _{GSS}	V _{GS} = ± 10 V		-	-	± 100	nA
Zaus Cata Valtana Dusin Commant	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V		-	-	25	μΑ
Zero Gate Voltage Drain Current		V _{DS} = 48 V, V _{GS} = 0 V, T _J = 150 °C		-	-	250	
Duain Cauras On State Besistance	П	V _{GS} = 10 V	I _D = 21 A ^b	-	0.024	ī	Ω
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 4.5 V	I _D = 15 A ^b	-	0.028	-	
Forward Transconductance	9 _{fs}	V _{DS} :	= 25 V, I _D = 21A ^b	23	-	-	S
Dynamic		•					
Input Capacitance	C _{iss}	$V_{GS} = 0 \text{ V},$ $V_{DS} = 25 \text{ V},$ $f = 1.0 \text{ MHz}, \text{ see fig. 5}$		-	190		
Output Capacitance	C _{oss}			-	920	-	рF
Reverse Transfer Capacitance	C _{rss}			-	170	-	
Total Gate Charge	Qg			-	-	66	nC
Gate-Source Charge	Q_{gs}	$V_{GS} = 5.0 \text{ V}$	$I_D = 51 \text{ A}, V_{DS} = 48 \text{ V},$ see fig. 6 and 13^b	-	-	12	
Gate-Drain Charge	Q_{gd}	See lig. 6 and 16		-	-	43	1
Turn-On Delay Time	t _{d(on)}			-	17	-	
Rise Time	t _r	$V_{DD} = 30 \text{ V}, I_D = 51 \text{ A},$ $R_g = 4.6 \Omega, R_D = 0.56 \Omega, \text{ see fig. } 10^b$		-	230	-	- ns
Turn-Off Delay Time	t _{d(off)}			-	2	-	
Fall Time	t _f			-	110	-	
Internal Drain Inductance	L_D	Between lead, 6 mm (0.25") from package and center of die contact		-	4.5	-	ъU
Internal Source Inductance	L _S			-	7.5	1	- nH
Drain-Source Body Diode Characteristic	s						
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	50°	А
Pulsed Diode Forward Current ^a	I _{SM}			-	-	200	
Body Diode Voltage	V_{SD}	T _J = 25 °C	I_{S} , I_{S} = 51 A, V_{GS} = 0 V^{b}	-	-	2.5	V
Body Diode Reverse Recovery Time	t _{rr}	T _J = 25 °C, I _F = 51 A, dl/dt = 100 A/μs ^b		-	130	180	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	0.84	1.3	μC
Forward Turn-On Time	t _{on}	Intrinsic tu	rn-on is dominated by L _S and L _I			L _D)	

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
 b. Pulse width ≤ 300 μs; duty cycle ≤ 2 %.
 c. Current limited by the package, (Die Current = 51 A).



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Fig. 1 - Typical Output Characteristics, $T_C = 25$ °C

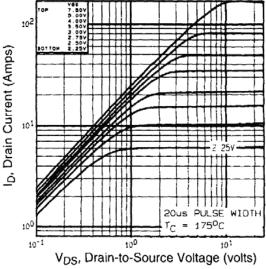


Fig. 2 - Typical Output Characteristics, $T_C = 150 \, ^{\circ}C$

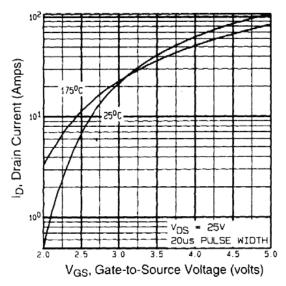


Fig. 3 - Typical Transfer Characteristics

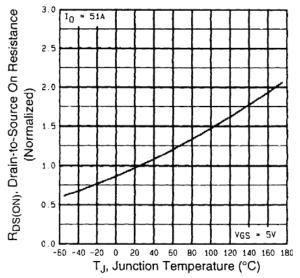


Fig. 4 - Normalized On-Resistance vs. Temperature



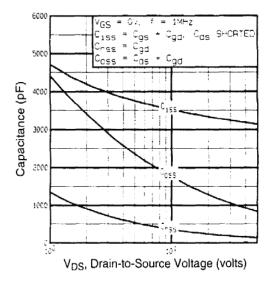


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

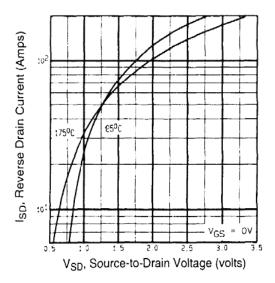


Fig. 7 - Typical Source-Drain Diode Forward Voltage

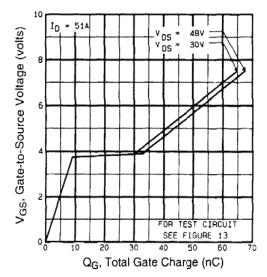


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage

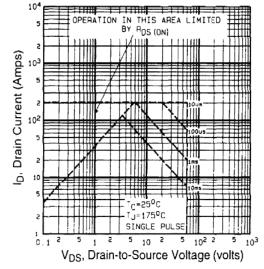


Fig. 8 - Maximum Safe Operating Area



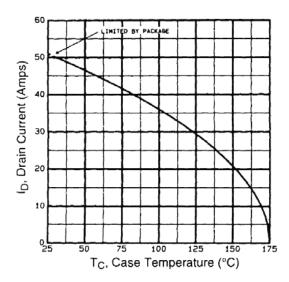


Fig. 9 - Maximum Drain Current vs. Case Temperature

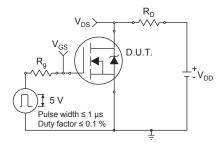


Fig. 10a - Switching Time Test Circuit

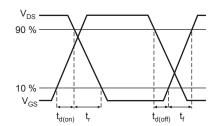


Fig. 10b - Switching Time Waveforms

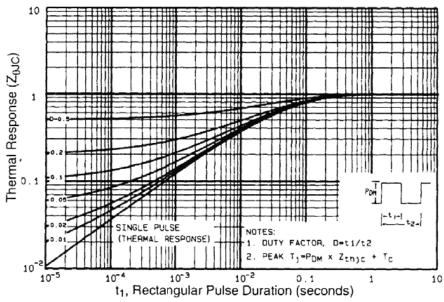
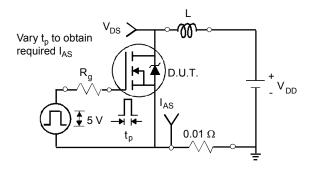


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case



 V_{DD}



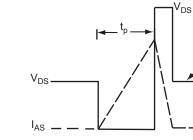


Fig. 12a - Unclamped Inductive Test Circuit

Fig. 12b - Unclamped Inductive Waveforms

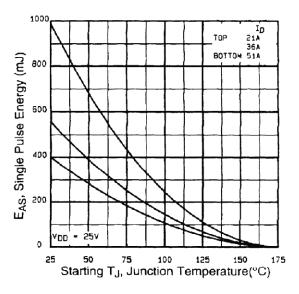


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

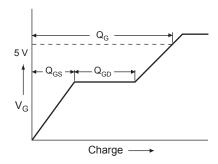


Fig. 13a - Basic Gate Charge Waveform

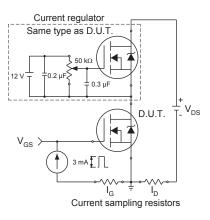
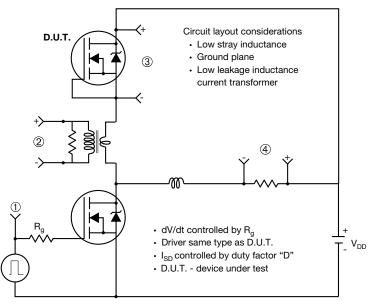


Fig. 13b - Gate Charge Test Circuit



Peak Diode Recovery dV/dt Test Circuit



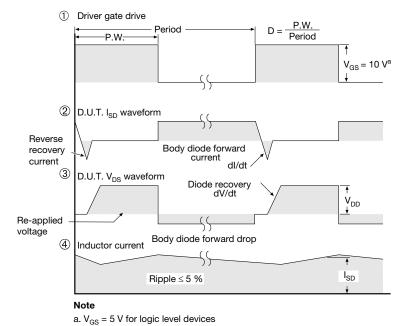
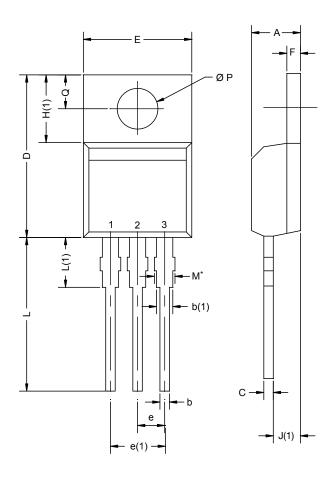


Fig. 14 - For N-Channel



TO-220AB



	MILLIM	IETERS	INC	HES		
DIM.	MIN.	MAX.	MIN.	MAX.		
Α	4.25	4.65	0.167	0.183		
b	0.69	1.01	0.027	0.040		
b(1)	1.20	1.73	0.047	0.068		
С	0.36	0.61	0.014	0.024		
D	14.85	15.49	0.585	0.610		
Е	10.04	10.51	0.395	0.414		
е	2.41	2.67	0.095	0.105		
e(1)	4.88	5.28	0.192	0.208		
F	1.14	1.40	0.045	0.055		
H(1)	6.09	6.48	0.240	0.255		
J(1)	2.41	2.92	0.095	0.115		
L	13.35	14.02	0.526	0.552		
L(1)	3.32	3.82	0.131	0.150		
ØΡ	3.54	3.94	0.139	0.155		
Q	2.60	3.00	0.102	0.118		
ECN: X12-0208-Rev. N, 08-Oct-12						

DWG: 5471

Notes

 $^{^{\}star}$ M = 1.32 mm to 1.62 mm (dimension including protrusion) Heatsink hole for HVM



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