

MTP12P06-VB Datasheet N-Channel 60 V(D-S) MOSFET

PRODUCT SUMMARY					
V _{DS} (V)	60				
R _{DS(on)} (Ω)	V _{GS} = 10 V 0.072				
Q _g max. (nC)	25				
Q _{gs} (nC)	5.8				
Q _{gd} (nC)	11				
Configuration	Sing	le			

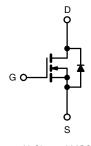
FEATURES

- Dynamic dV/dt rating
- · Fast switching
- Ease of paralleling

Simple drive requirements







N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C	= 25 °C, unl	less otherwis	se noted)			
PARAMETER		SYMBOL	LIMIT	UNIT		
Drain-Source Voltage			V _{DS}	60	Ň	
Gate-Source Voltage			V _{GS}	± 20	V	
Continuous Drain Current	V _{GS} at 10 V	$T_{\rm C} = 25 \ ^{\circ}{\rm C}$ $T_{\rm C} = 100 \ ^{\circ}{\rm C}$	Ι _D	20		
Continuous Drain Current	V _{GS} at 10 V	T _C = 100 °C		12	А	
Pulsed Drain Current ^a		I _{DM}	68	1		
Linear Derating Factor			0.40	W/°C		
Single Pulse Avalanche Energy ^b		E _{AS}	100	mJ		
Maximum Power Dissipation	on $T_{\rm C} = 25 ^{\circ}{\rm C}$		PD	60	W	
Peak Diode Recovery dV/dt ^c		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	for	10 s		300		
Mounting Torque	6 20 or l	12 005014		10	lbf ∙ in	
Mounting Torque	6-32 or M3 screw		-	1.1	N · m	

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

- b. $V_{DD} = 25 \text{ V}$, starting $T_J = 25 \text{ °C}$, $L = 403 \mu\text{H}$, $R_g = 25 \Omega$, $I_{AS} = 17 \text{ A}$ (see fig. 12). c. $I_{SD} \le 17 \text{ A}$, $dI/dt \le 140 \text{ A/}\mu\text{s}$, $V_{DD} \le V_{DS}$, $T_J \le 175 \text{ °C}$.

d. 1.6 mm from case.



THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum Junction-to-Ambient	R _{thJA}	-	62	
Case-to-Sink, Flat, Greased Surface	R _{thCS}	0.50	-	°C/W
Maximum Junction-to-Case (Drain)	R _{thJC}	-	2.5	

PARAMETER	SYMBOL	TES	T CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static					•		
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} =	= 0 V, I _D = 250 μΑ	60	-	-	V
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	Referenc	e to 25 °C, I _D = 1 mA	-	0.061	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =	: V _{GS} , I _D = 250 μA	1.0	-	3.0	V
Gate-Source Leakage	I _{GSS}		V _{GS} = ± 20 V	-	-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}		= 60 V, V _{GS} = 0 V V _{GS} = 0 V, T _J = 150 °C	-		25 250	μA
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V		-	0.072	-	Ω
Forward Transconductance	9 _{fs}		= 25 V, I _D = 10 A	5.5	-	-	S
Dynamic				1		<u> </u>	1
Input Capacitance	C _{iss}		V _{GS} = 0 V, V _{DS} = 25 V,		640	-	pF
Output Capacitance	C _{oss}				360	-	
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz, see fig. 5		-	79	-	
Total Gate Charge	Qg		I _D = 17 A, V _{DS} = 48 V, see fig. 6 and 13 ^b	-	-	25	nC
Gate-Source Charge	Q _{gs}	V _{GS} = 10 V		-	-	5.8	
Gate-Drain Charge	Q _{gd}			-	-	11	
Turn-On Delay Time	t _{d(on)}			-	13	-	
Rise Time	t _r	- V:	V _{DD} = 30 V, I _D = 17 A,		58	-	- ns
Turn-Off Delay Time	t _{d(off)}	$R_g = 18 \Omega$, $R_D = 1.7 \Omega$, see fig. 10 ^b		-	25	-	
Fall Time	t _f			-	42	-	
Internal Drain Inductance	L _D	6 mm (0.25") f	Between lead, 6 mm (0.25") from		4.5	-	
Internal Source Inductance	L _S	die contact		-	7.5	-	- nH
Drain-Source Body Diode Characteristic	s				•		
Continuous Source-Drain Diode Current	I _S	MOSFET sym showing the	MOSFET symbol		-	20	Α
Pulsed Diode Forward Current ^a	I _{SM}	integral revers p - n junction		-	-	68	
Body Diode Voltage	V _{SD}	T _J = 25 °C	, $I_{\rm S}$ = 17 A, $V_{\rm GS}$ = 0 V ^b	-	-	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	$T_J = 25 \text{ °C}, I_F = 17 \text{ A}, dl/dt = 100 \text{ A}/\mu\text{s}$		-	88	180	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	0.29	0.64	μC
Forward Turn-On Time	t _{on}	Intrinsic tu	rn-on time is negligible (turn	-on is doi	minated b	y L _S and	L _D)

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width \leq 300 µs; duty cycle \leq 2 %.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

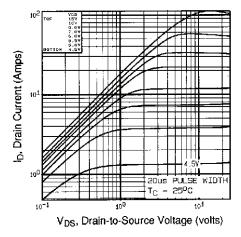


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

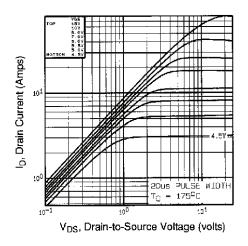


Fig. 2 - Typical Output Characteristics, T_C = 175 °C

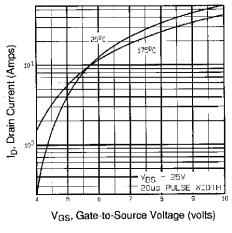


Fig. 3 - Typical Transfer Characteristics

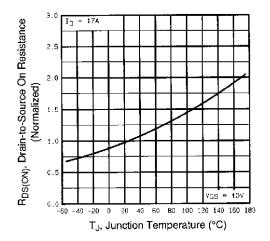


Fig. 4 - Normalized On-Resistance vs. Temperature

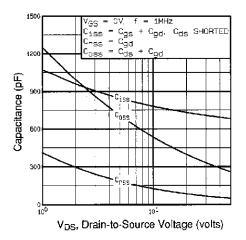


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

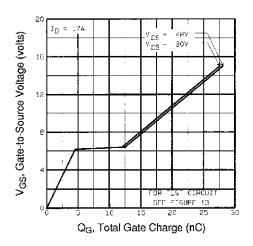


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



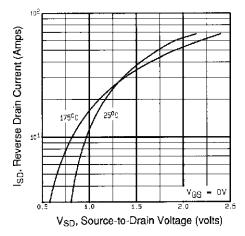


Fig. 7 - Typical Source-Drain Diode Forward Voltage

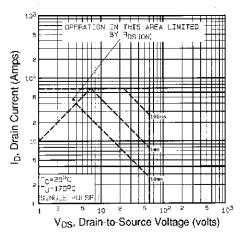


Fig. 8 - Maximum Safe Operating Area

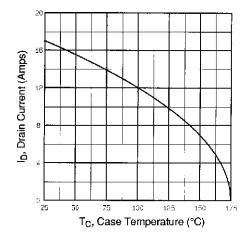


Fig. 9 - Maximum Drain Current vs. Case Temperature

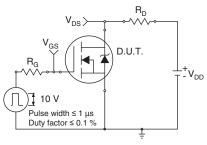


Fig. 10a - Switching Time Test Circuit

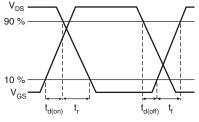
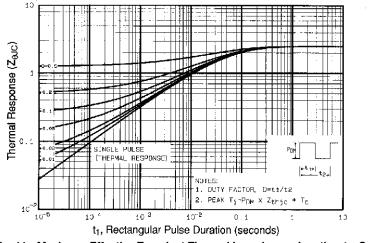


Fig. 10b - Switching Time Waveforms







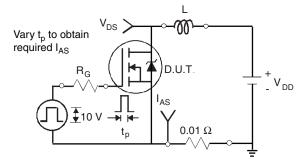


Fig. 12a - Unclamped Inductive Test Circuit

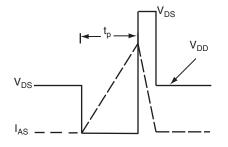


Fig. 12b - Unclamped Inductive Waveforms

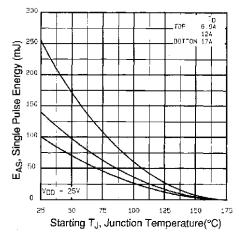


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

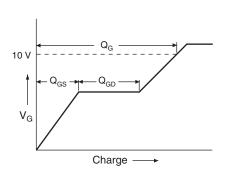


Fig. 13a - Basic Gate Charge Waveform

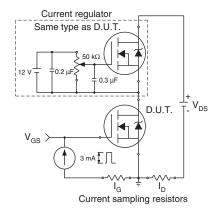
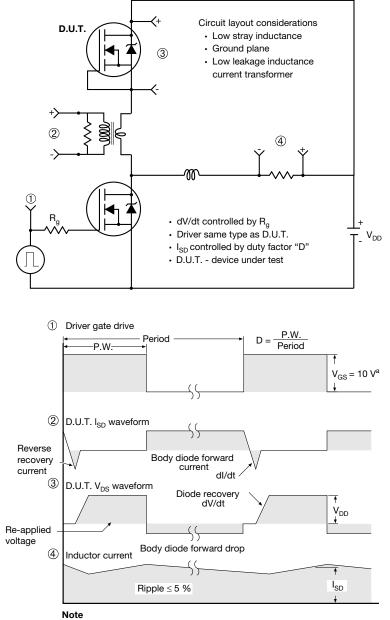


Fig. 13b - Gate Charge Test



Peak Diode Recovery dV/dt Test Circuit

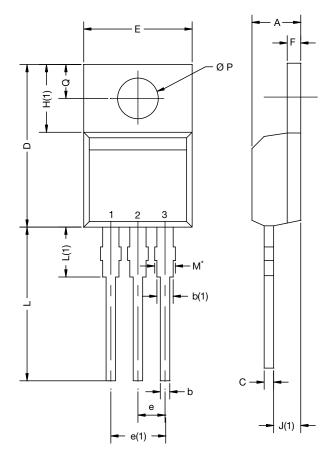


a. $V_{GS} = 5 V$ for logic level devices

Fig. 14 - For N-Channel



TO-220



DIM.	MILLIN	IETERS	INCHES		
DIM.	MIN.	MAX.	MIN.	MAX.	
А	4.24	4.65	0.167	0.183	
b	0.69	1.02	0.027	0.040	
b(1)	1.14	1.78	0.045	0.070	
С	0.36	0.61	0.014	0.024	
D	14.33	15.85	0.564	0.624	
E	9.96	10.52	0.392	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)	6.10	6.71	0.240	0.264	
J(1)	2.41	2.92	0.095	0.115	
L	13.36	14.40	0.526	0.567	
L(1)	3.33	4.04	0.131	0.159	
ØР	3.53	3.94	0.139	0.155	
Q	2.54	3.00	0.100	0.118	
ECN: X15- DWG: 603	0364-Rev. C, 1	14-Dec-15			

Note

- M^{\star} = 0.052 inches to 0.064 inches (dimension including protrusion), heatsink hole for HVM



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