

100V P-Channel Power MOSFET

Description

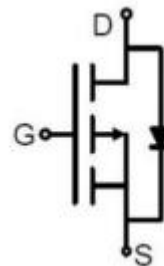
The MDT20P10D, uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

- ① $V_{DS}=-100V, I_D=-20A$
 $R_{DS(ON)} < 80m\Omega @ V_{GS}=-10V$
 $R_{DS(ON)} < 90m\Omega @ V_{GS}=-4.5V$
- ② High density cell design for lower R_{dson}
- ③ Fully characterized avalanche voltage and current
- ④ Good stability and uniformity with high EAS
- ⑤ Excellent package for good heat dissipation

Application

- ① Power switching application
- ② Hard switched and High frequency circuits
- ③ Uninterruptible power supply



Schematic diagram



TO-252

Package Marking And Ordering Information

Device Marking	Ordering Codes	Package	Product Code	Packing
MDT20P10	MDT20P10-D	TO-252	MDT20P10D	Reel

Absolute Maximum Ratings ($T_A=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-100	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current-Continuous	-20	A
I_{DM}	Drain Current-Pulsed (Note 1)	-20	A
P_D	Maximum Power Dissipation($T_A=25^{\circ}C$)	72	W
E_{AS}	Single pulse avalanche energy(Note 2)	80	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	$^{\circ}C$

Thermal Characteristic

$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	2.12	$^{\circ}C/W$
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Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-100	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-100V,V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V,V _{DS} =0V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} ,I _D =-250μA	-1.0	-1.7	-2.4	V
R _{DS(ON)}	Drain-Source On-State Resistance ^(Note 3)	V _{GS} =-10V, I _D =-10A	-	70	80	mΩ
		V _{GS} =-4.5V, I _D =-10A	-	80	90	
g _{FS}	Forward Transconductance	V _{DS} =-50V,I _D =-10A	-	7.2	-	S
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{DS} =-50V,V _{GS} =0V, f=1.0MHz	-	2360	-	pF
C _{OSS}	Output Capacitance		-	81	-	pF
C _{RSS}	Reverse Transfer Capacitance		-	67	-	pF
Switching Characteristics (Note 4)						
t _{d(on)}	Turn-on Delay Time	V _{DD} =-50V, I _D =-20A, V _{GS} =-10V,R _{GEN} =10Ω	-	20	-	nS
t _r	Turn-on Rise Time		-	11	-	nS
t _{d(off)}	Turn-Off Delay Time		-	100	-	nS
t _f	Turn-Off Fall Time			38	-	nS
Q _g	Total Gate Charge	V _{DS} =-50V,I _D =-16A V _{GS} =-10V	-	71	-	nC
Q _{gs}	Gate-Source Charge		-	13	-	nC
Q _{gd}	Gate-Drain Charge		-	13	-	nC
Drain-Source Diode Characteristics						
V _{SD}	Diode Forward Voltage	V _{GS} =0V,I _S =-10A	-	-	-1.2	V

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.EAS condition : $T_j=25^{\circ}\text{C}, V_{DD}=-50V, V_{GS}=-10V, L=0.5mH, R_g=25\Omega$
- 3.Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.Guaranteed by design, not subject to production

Characteristics Curves

Figure 1 Output Characteristics

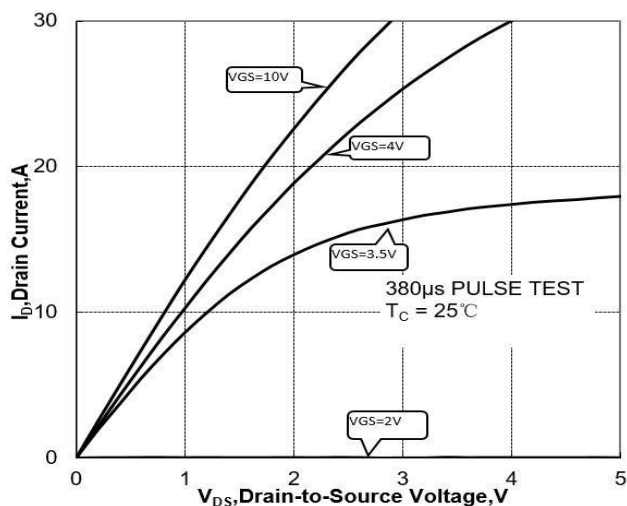


Figure 2 Transfer Characteristics

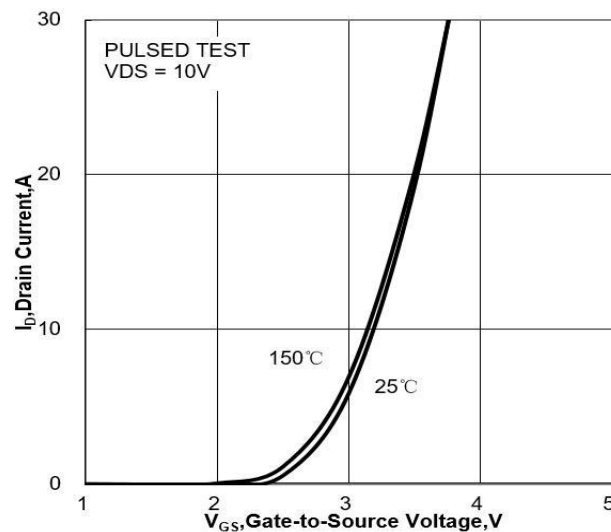


Figure 3 On-Resistance vs. I_D and V_{GS}

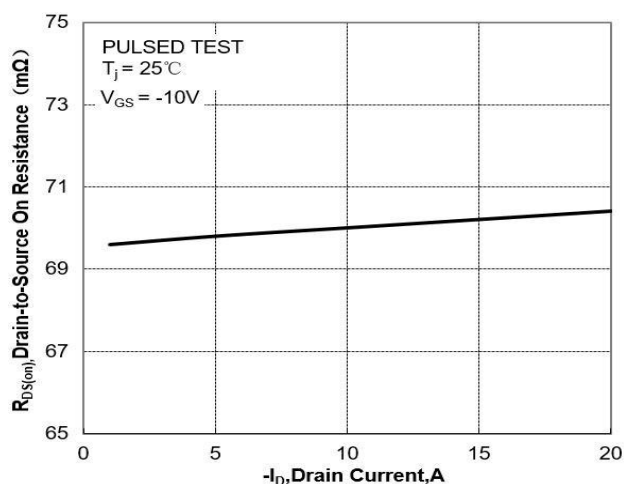


Figure 4 On-Resistance vs. Junction Temperature

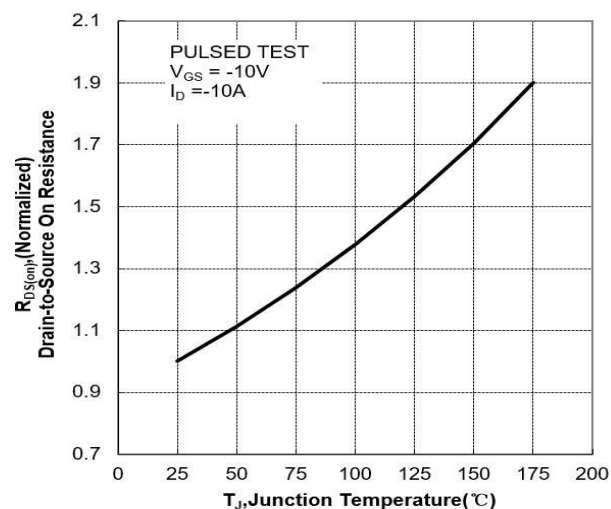


Figure 5 On-Resistance vs. V_{GS}

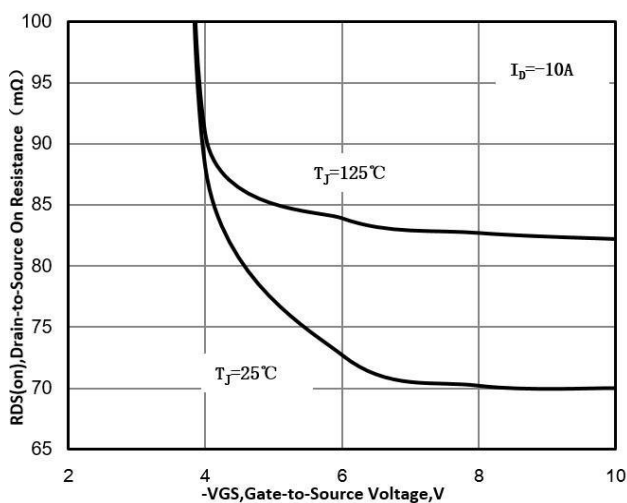


Figure 6 Body Diode Forward Voltage

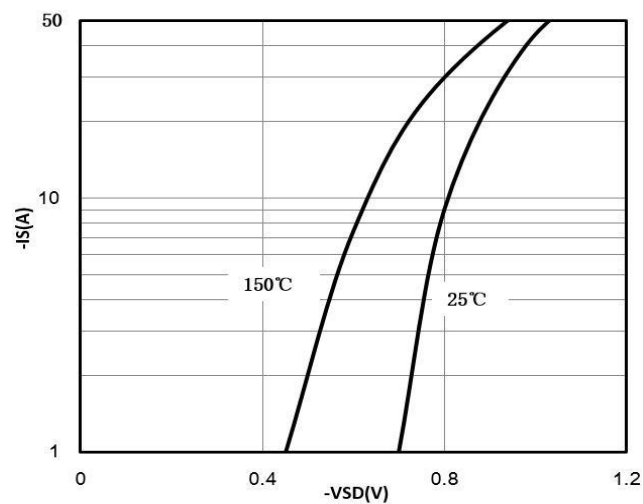


Figure 7 Gate-Charge Characteristics

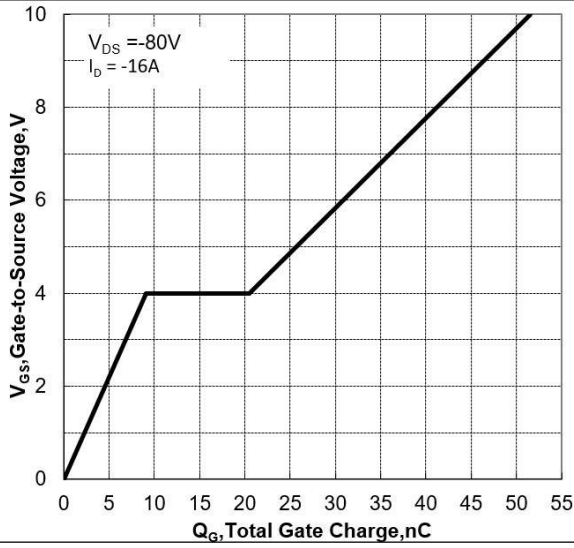


Figure 8 Capacitance Characteristics

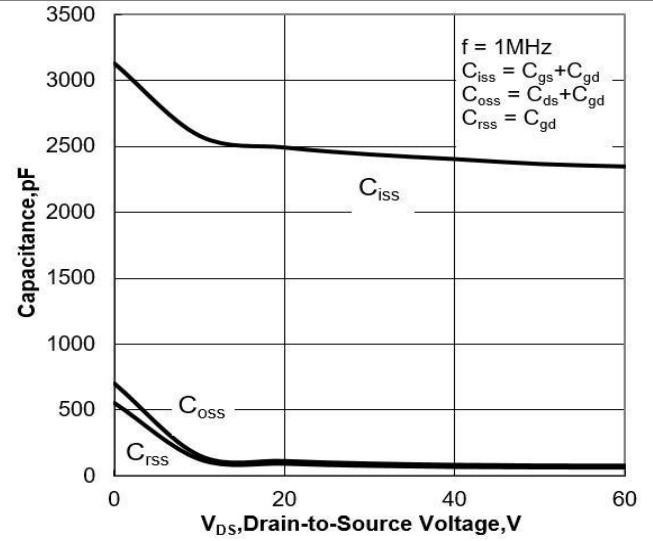


Figure 9 Maximum Forward Biased Safe Operation Area

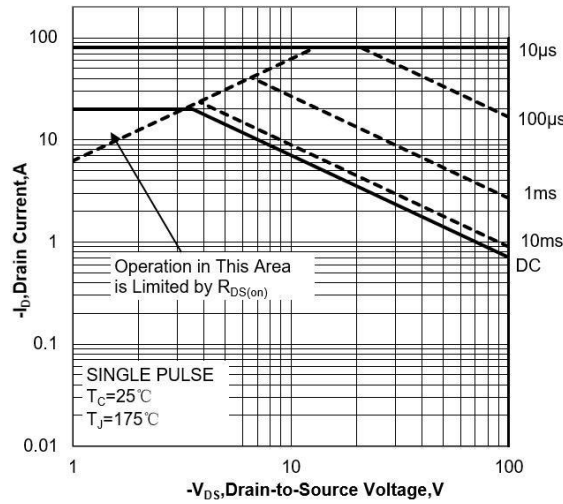


Figure 10 Single Pulse Power Rating Junction-to-Ambient

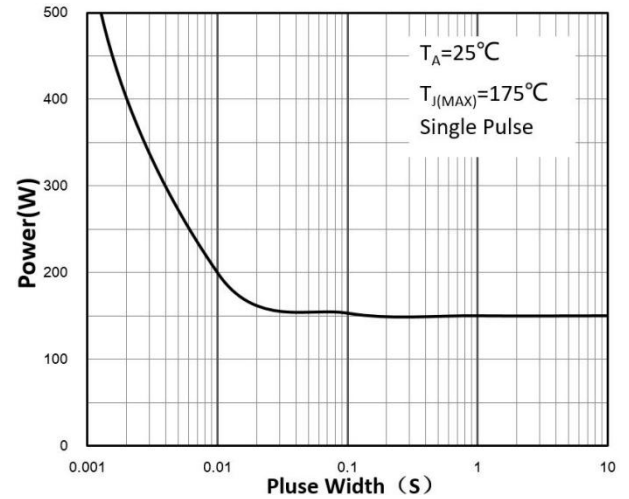
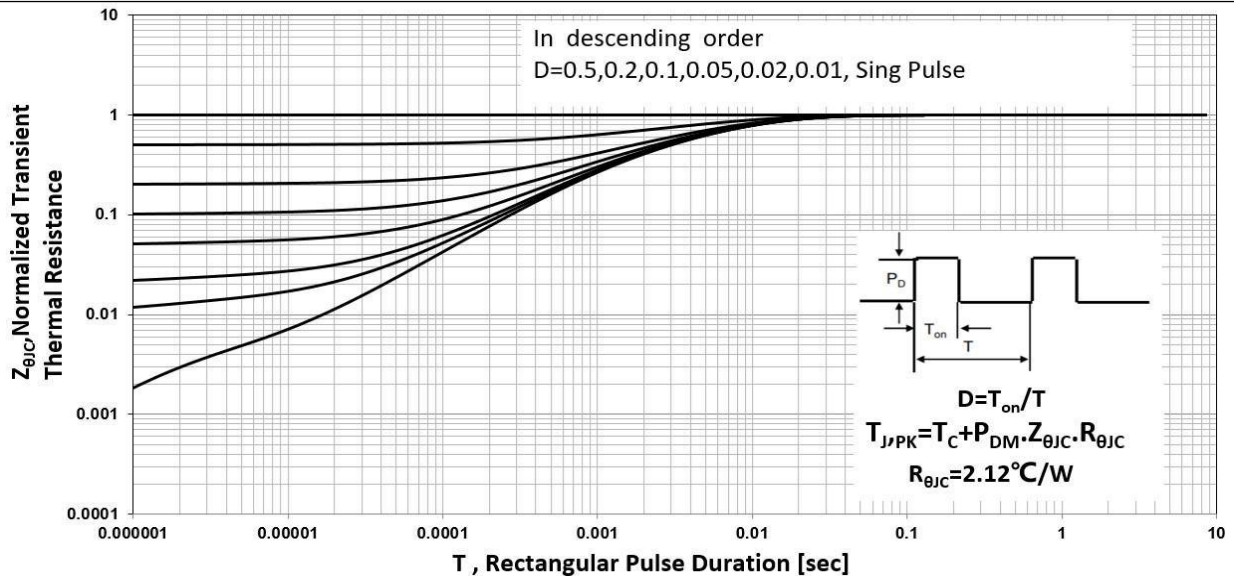
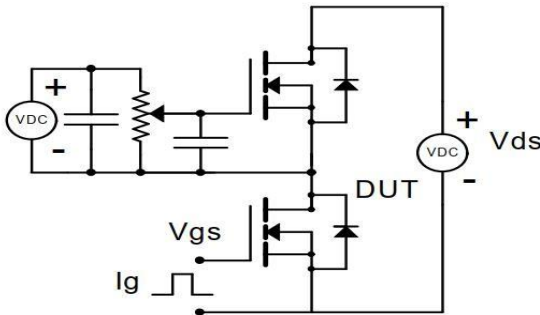
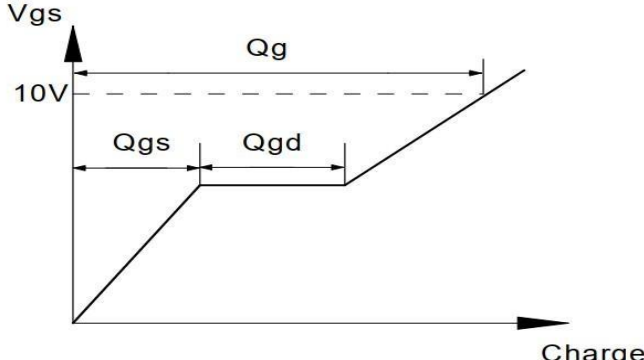
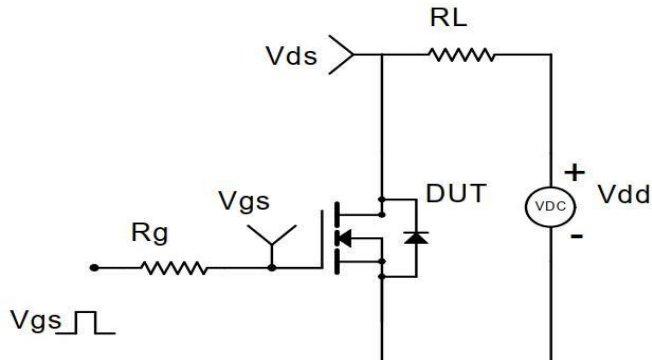
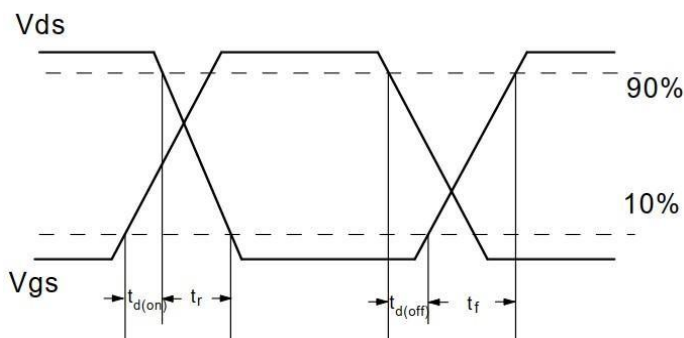
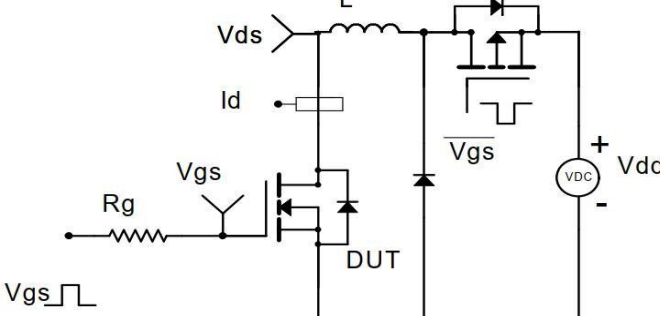
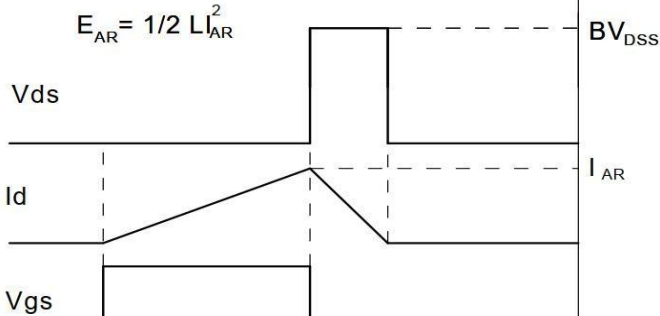


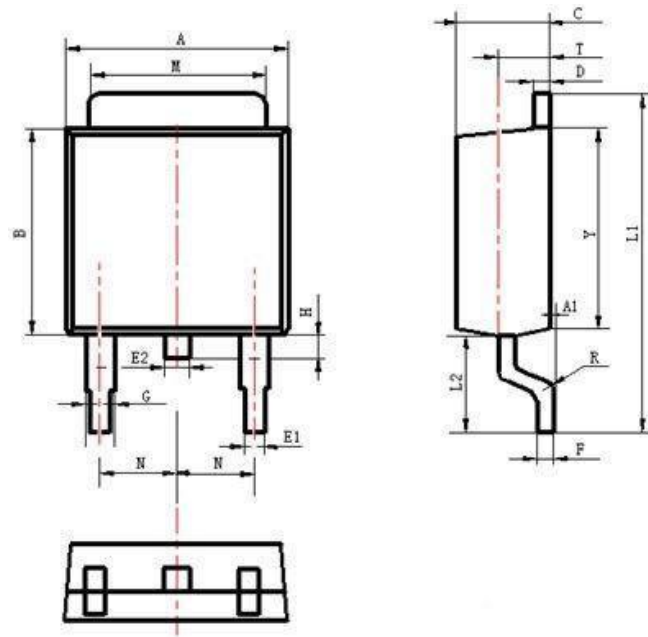
Figure 11 Normalized Maximum Transient Thermal Impedance



Test Circuit and Waveform

Gate Charge Test Circuit	Gate Charge Test Waveform
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse source V_{gs} through a resistor. A current source I_g is connected to the gate. The drain is connected to a load resistor and a DC source V_{ds}. A VDC meter is connected across the drain-source terminals.	 The graph shows V_{gs} on the y-axis and Charge on the x-axis. The waveform consists of a linear ramp up to 10V, a constant plateau at 10V, and a linear ramp down. The total area under the curve is labeled Q_g. The area under the ramp up is Q_{gs} and the area under the ramp down is Q_{gd}.
Resistive Switching Test Circuit	Resistive Switching Test Waveforms
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse source V_{gs} through a resistor R_g. The drain is connected to a load resistor R_L and a DC source V_{dd}. A VDC meter is connected across the drain-source terminals.	 The graph shows V_{ds} and V_{gs} on the y-axis. The V_{gs} waveform is a square wave. The V_{ds} waveform shows the switching transient. Key time points are marked: $t_{d(on)}$, t_r, t_{on}, $t_{d(off)}$, t_f, and t_{off}. The 90% and 10% voltage levels are indicated on the V_{ds} waveform.
Unclamped Inductive Switching (UIS) Test Circuit	Unclamped Inductive Switching (UIS) Test Waveforms
 The diagram shows a MOSFET (DUT) with its gate connected to a pulse source V_{gs} through a resistor R_g. The drain is connected to an inductor L and a DC source V_{dd}. A diode is connected in parallel with the inductor. A VDC meter is connected across the drain-source terminals.	 The graph shows V_{ds}, I_d, and V_{gs} on the y-axis. The V_{gs} waveform is a square wave. The V_{ds} waveform shows the switching transient. The I_d waveform shows the current during the switching transient. The energy $E_{AR} = 1/2 L I_{AR}^2$ is indicated. The peak voltage is BV_{DSS} and the peak current is I_{AR}.

Package Description



Items	Values(mm)	
	MIN	MAX
A	6.30	6.90
A1	0	0.13
B	5.70	6.30
C	2.10	2.50
D	0.30	0.60
E1	0.60	0.90
E2	0.70	1.00
F	0.30	0.60
G	0.70	1.20
L1	9.60	10.50
L2	2.70	3.10
H	0.60	1.00
M	5.10	5.50
N	2.09	2.49
R	0.3	
T	1.40	1.60
Y	5.10	6.30

TO-252 Package



迈诺斯科技

MDT20P10D

NOTE:

1. Exceeding the maximum ratings of the device in performance may cause damage to the device, even the permanent failure, which may affect the dependability of the machine. Please do not exceed the absolute maximum ratings of the device when circuit designing.
2. When installing the heat sink, please pay attention to the torsional moment and the smoothness of the heat sink.
3. MOSFETs is the device which is sensitive to the static electricity, it is necessary to protect the device from being damaged by the static electricity when using it.
4. Shenzhen Minos reserves the right to make changes in this specification sheet and is subject to change without prior notice.

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