

## Silicon N-Channel Power MOSFET

### Description

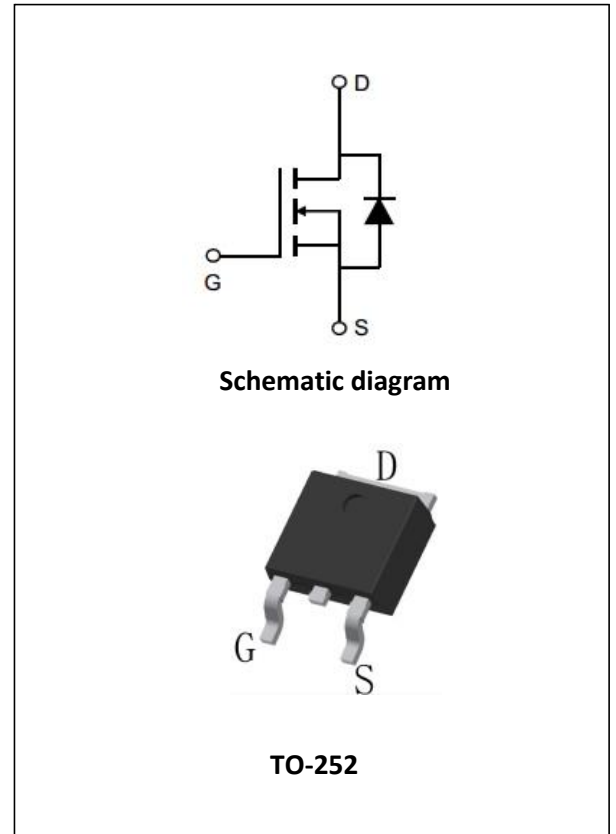
The MDT70N03 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications.

### KEY CHARACTERISTICS

- ①  $V_{DS} = 30V, I_D = 70A$   
 $R_{DS(ON)} < 6m\Omega @ V_{GS}=10V$   
 $R_{DS(ON)} < 8m\Omega @ V_{GS}=5V$
- ② High density cell design for ultra low  $R_{dson}$
- ③ Fully characterized Avalanche voltage and current
- ④ Good stability and uniformity with high EAS
- ⑤ Excellent package for good heat dissipation
- ⑥ Special process technology for high ESD capability

### APPLICATIONS

- ① Power switching application
- ② Hard switched and high frequency circuits
- ③ Uninterruptible Power Supply



### ORDERING INFORMATION

Ordering Codes	Package	Product Code	Packing
MDT70N03	TO-252	MDT70N03	Tube

### Absolute Maximum Ratings (TC=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	70	A
Drain Current-Continuous(TC=100°C)	$I_D(100^\circ C)$	35	A
Pulsed Drain Current	$I_{DM}$	140	A
Maximum Power Dissipation	$P_D$	60	W
Derating factor		0.4	W/°C
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	225	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 175	°C

**Thermal Characteristic**

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	2.5	$^{\circ}\text{C}/\text{W}$
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**Electrical Characteristics (TC=25 $^{\circ}\text{C}$  unless otherwise noted)**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30\text{V}, V_{GS}=0\text{V}$	-	-	1	$\mu\text{A}$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20\text{V}, V_{DS}=0\text{V}$	-	-	$\pm 100$	nA
<b>On Characteristics</b> <sup>(Note 3)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1.0	1.1	1.4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}, I_D=25\text{A}$	-	6	8	m $\Omega$
		$V_{GS}=4.5\text{V}, I_D=20\text{A}$	-	8	12	
Forward Transconductance	$g_{FS}$	$V_{DS}=5\text{V}, I_D=20\text{A}$	15	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note 4)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=15\text{V}, V_{GS}=0\text{V},$ $F=1.0\text{MHz}$	-	2000	-	PF
Output Capacitance	$C_{oss}$		-	280	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	160	-	PF
<b>Switching Characteristics</b> <sup>(Note 4)</sup>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15\text{V}, I_D=25\text{A}$ $V_{GS}=10\text{V}, R_{GEN}=1.8\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	30	-	nS
Turn-Off Fall Time	$t_f$		-	5	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10\text{V}, I_D=25\text{A},$ $V_{GS}=10\text{V}$	-	23	-	nC
Gate-Source Charge	$Q_{gs}$		-	7	-	nC
Gate-Drain Charge	$Q_{gd}$		-	4.5	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note 3)</sup>	$V_{SD}$	$V_{GS}=0\text{V}, I_S=25\text{A}$	-	0.85	1.2	V
Diode Forward Current <sup>(Note 2)</sup>	$I_S$		-	-	50	A
Reverse Recovery Time	$t_{rr}$	$T_J = 25^{\circ}\text{C}, I_F = 25\text{A}$ $di/dt = 100\text{A}/\mu\text{s}$ <sup>(Note 3)</sup>	-	22	35	nS
Reverse Recovery Charge	$Q_{rr}$		-	11	18	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

## Notes:

Repetitive Rating: Pulse width limited by maximum junction temperature.

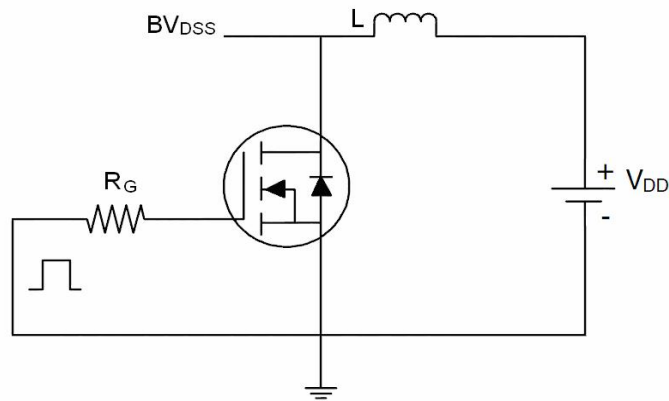
Surface Mounted on FR4 Board,  $t \leq 10$  sec.

Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

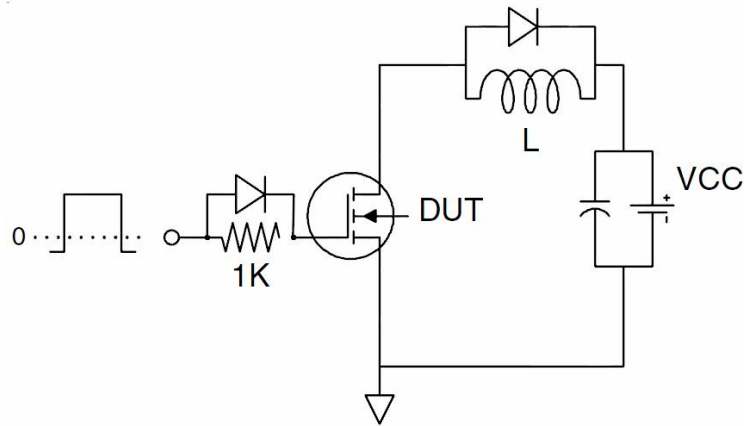
Guaranteed by design, not subject to production

EAS condition:  $T_J=25^{\circ}\text{C}$ ,  $V_{DD}=15\text{V}$ ,  $V_G=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\Omega$

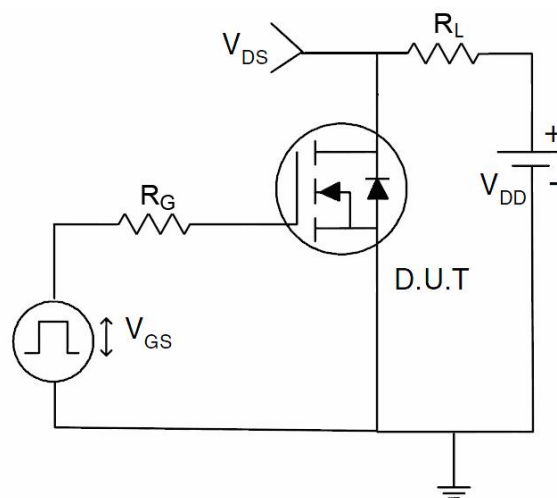
1) EAS test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



Typical Electrical and Thermal Characteristics (Curves)

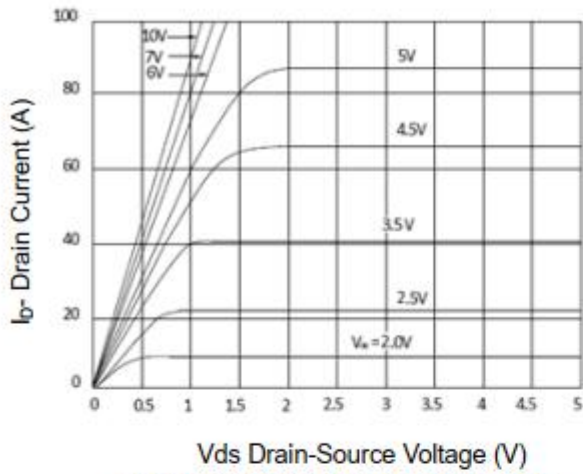


Figure 1 Output Characteristics

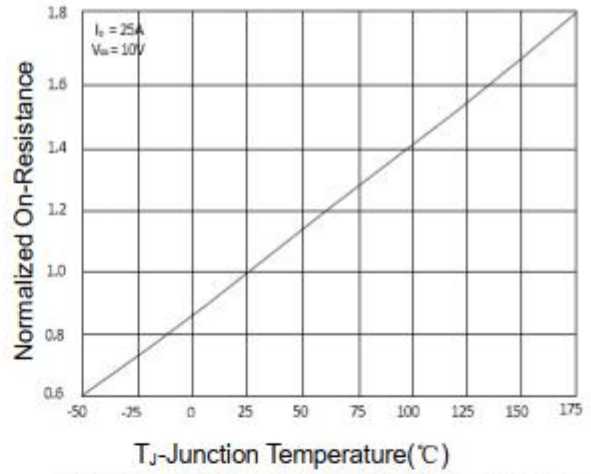


Figure 4  $R_{dson}$ -Junction Temperature

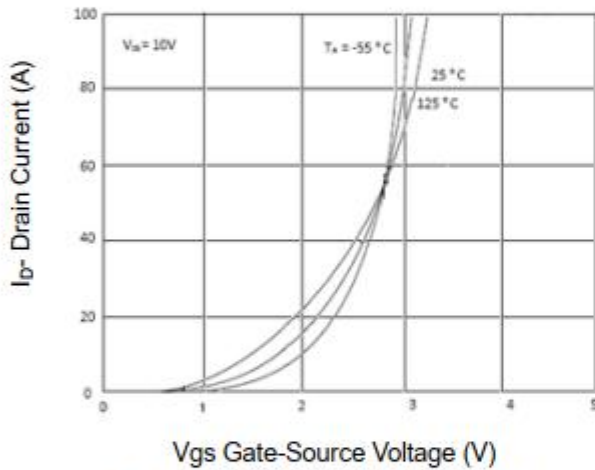


Figure 2 Transfer Characteristics

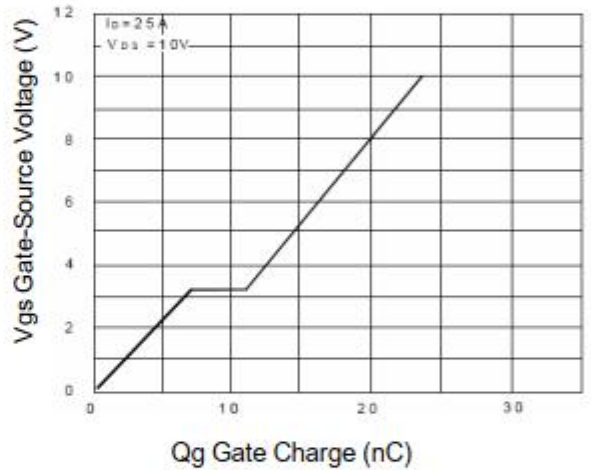


Figure 5 Gate Charge

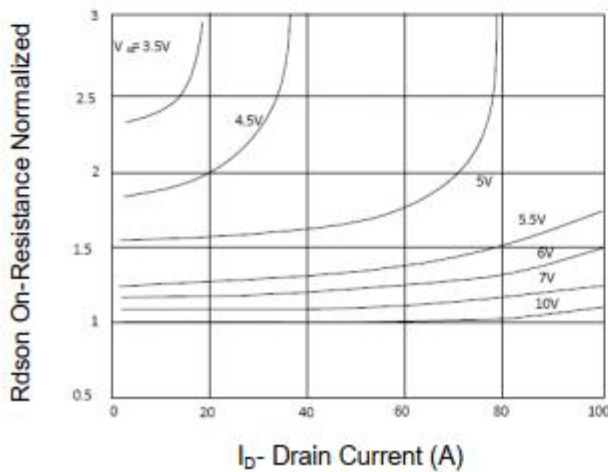


Figure 3  $R_{dson}$ - Drain Current

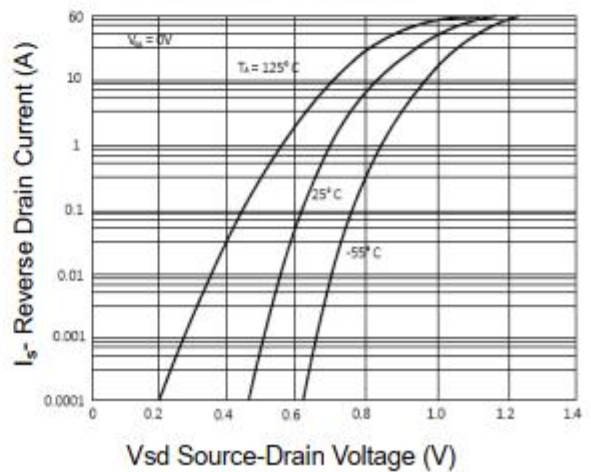


Figure 6 Source- Drain Diode Forward

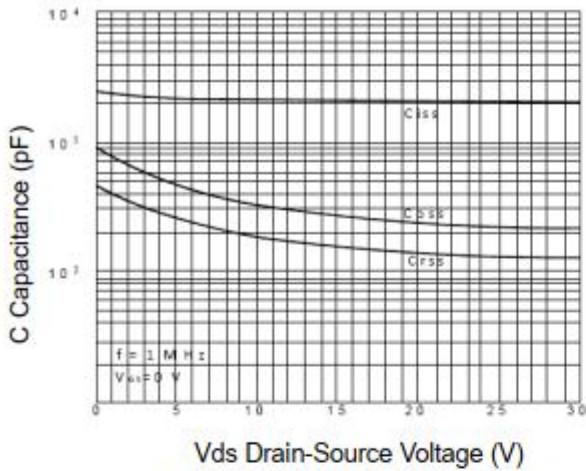


Figure 7 Capacitance vs Vds

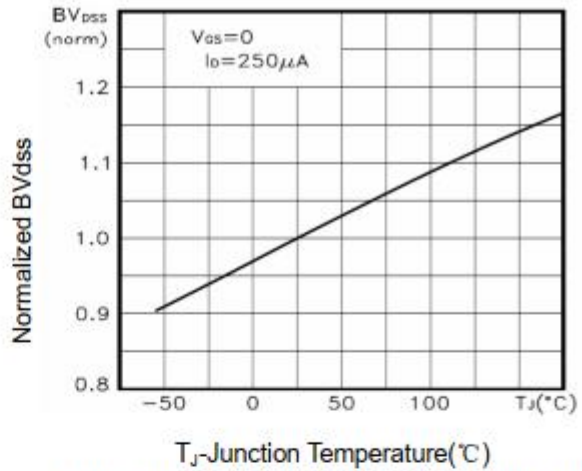


Figure 9  $BV_{DSS}$  vs Junction Temperature

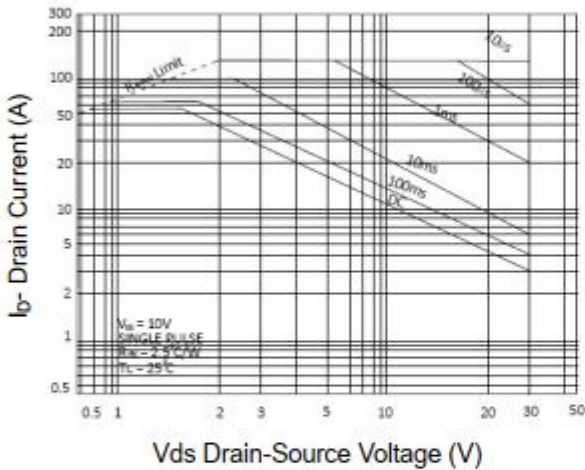


Figure 8 Safe Operation Area

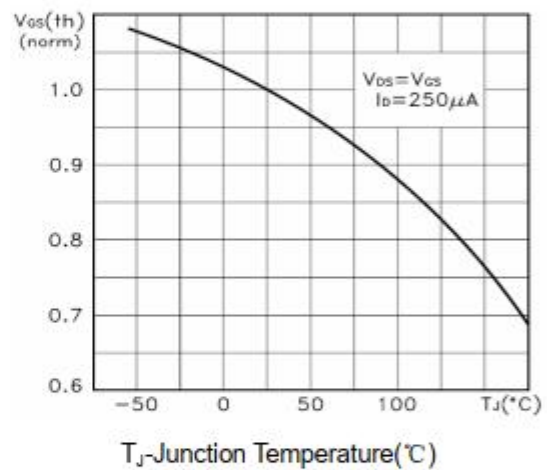


Figure 10  $V_{GS(th)}$  vs Junction Temperature

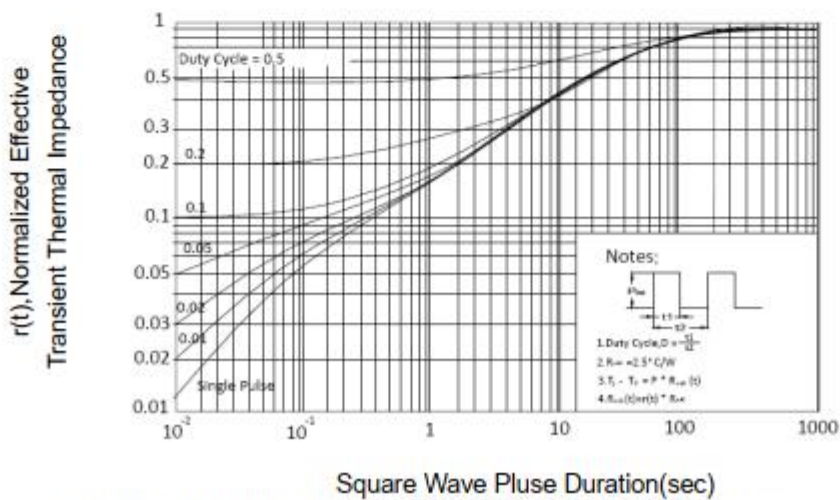
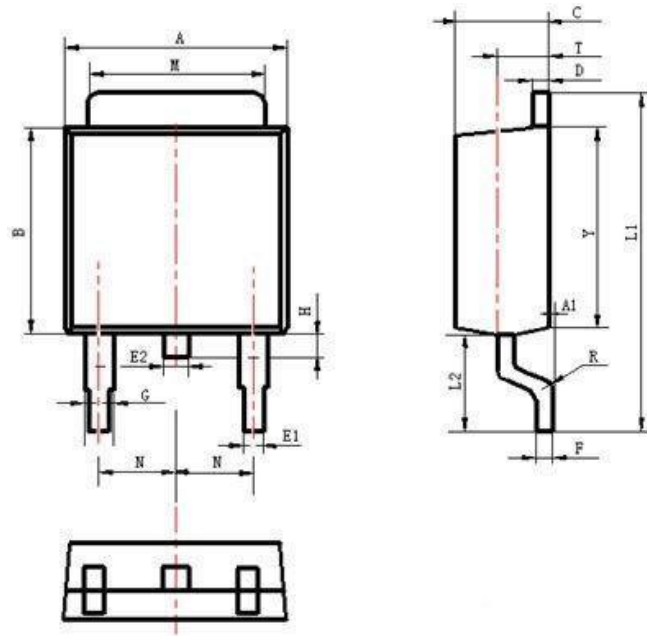


Figure 11 Normalized Maximum Transient Thermal Impedance

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



**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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