

N-Channel Enhancement Mode Power MOSFET

MTN10N60E3

 $BV_{DSS} : 650V @ T_j=150^{\circ}C$ **$R_{DS(ON)} : 0.75 \Omega$** **$I_D : 10A$**

Description

The MTN10N60E3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220 package is universally preferred for all commercial-industrial applications

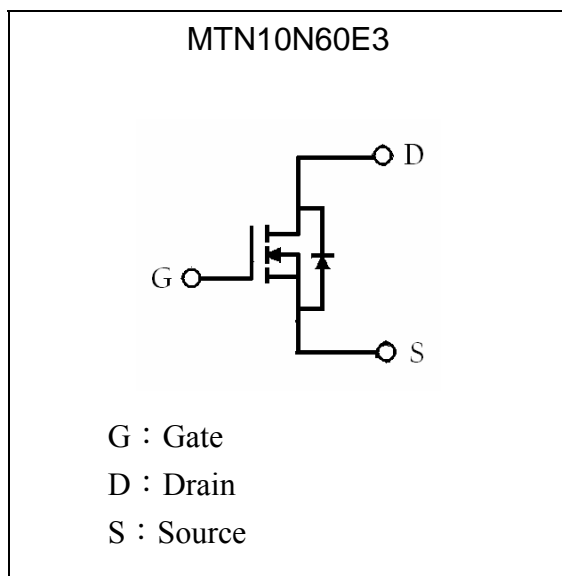
Features

- $BV_{DSS}=650V$ typically @ $T_j=150^{\circ}C$
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

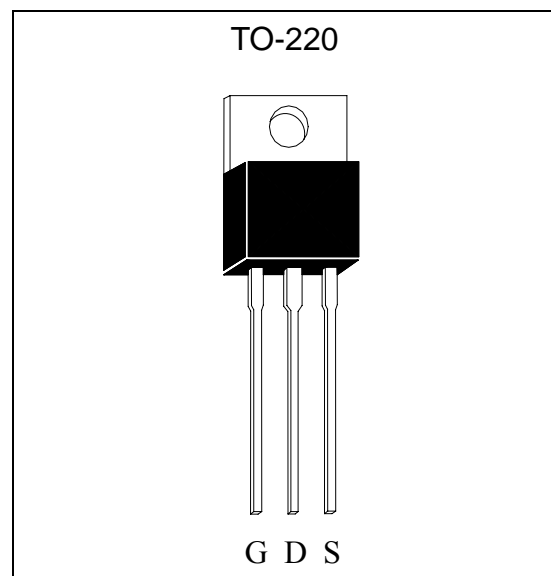
Applications

- Adaptor
- LCD Panel Power
- TV Main Power
- SMPS Standby Power

Symbol



Outline



**Absolute Maximum Ratings** ($T_c=25^\circ\text{C}$)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage (Note 1)	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	10	A
Continuous Drain Current @ $T_c=100^\circ\text{C}$	I_D	6	A
Pulsed Drain Current @ $V_{GS}=10\text{V}$ (Note 2)	I_{DM}	40	A
Single Pulse Avalanche Energy @ $L=10\text{mH}$, $I_D=10\text{Amps}$, $V_{DD}=50\text{V}$	E_{AS}	484	mJ
Repetitive Avalanche Energy	E_{AR}	21.6	
Peak Diode Recovery dv/dt (Note 3)	dv/dt	3.0	V/ns
Maximum Temperature for Soldering @ Lead at 0.063 in(1.6mm) from case for 10 seconds	T_L	300	$^\circ\text{C}$
Maximum Temperature for Soldering @ Package Body for 10 seconds	T_{PKG}	260	$^\circ\text{C}$
Total Power Dissipation ($T_c=25^\circ\text{C}$)	P_d	216	W
Linear Derating Factor		1.72	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature	T_j, T_{stg}	-55~+150	$^\circ\text{C}$

Note : *1. $T_J=+25^\circ\text{C}$ to $+150^\circ\text{C}$.

*2. Repetitive rating; pulse width limited by maximum junction temperature.

*3. $ISD=10\text{A}$, $dI/dt<100\text{A}/\mu\text{s}$, $V_{DD}<BV_{DSS}$, $T_J=+150^\circ\text{C}$.**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	0.58	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62	$^\circ\text{C}/\text{W}$



Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	600	-	-	V	V _{GS} =0, I _D =250μA
BV _{DSS}	-	650	-	V	V _{GS} =0, I _D =250μA, Tj=150°C
ΔBV _{DSS} /ΔTj	-	0.631	-	V/°C	Reference to 25°C, I _D =250μA
BV _{DS}	-	700	-	V	V _{GS} =0, I _D =10A
V _{GS(th)}	2.0	-	4.0	V	V _{DS} = V _{GS} , I _D =250μA
*G _{FS}	-	6.8	-	S	V _{DS} =15V, I _D =10A
I _{GSS}	-	-	±100	nA	V _{GS} =±30
I _{DSS}	-	-	25	μA	V _{DS} =600V, V _{GS} =0
I _{DSS}	-	-	250	μA	V _{DS} =480V, V _{GS} =0, Tj=125°C
*R _{DS(ON)}	-	0.65	0.75	Ω	V _{GS} =10V, I _D =6A
Dynamic					
*Q _g	-	39	-	nC	I _D =10A, V _{DD} =300V, V _{GS} =10V
*Q _{gs}	-	9.5	-		
*Q _{gd}	-	17.6	-		
*t _{d(ON)}	-	19	-	ns	V _{DD} =300V, I _D =10A, V _{GS} =10V, R _G =9.1 Ω
*t _r	-	16	-		
*t _{d(OFF)}	-	49	-		
*t _f	-	16	-		
C _{iss}	-	1882	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{oss}	-	170	-		
C _{rss}	-	20	-		
Source-Drain Diode					
*V _{SD}	-	-	1.5	V	I _S =10A, V _{GS} =0V
*I _S	-	-	10	A	V _D =V _G =0, V _S =1.3V
*I _{SM}	-	-	40		
*t _{rr}	-	352	528	ns	V _{GS} =0, I _F =10A, dI/dt=100A/μs
*Q _{rr}	-	2.9	4.35	μC	

*Pulse Test : Pulse Width ≤300μs, Duty Cycle ≤2%

Ordering Information

Device	Package	Shipping	Marking
MTN10N60E3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton	10N60

Characteristic Curves

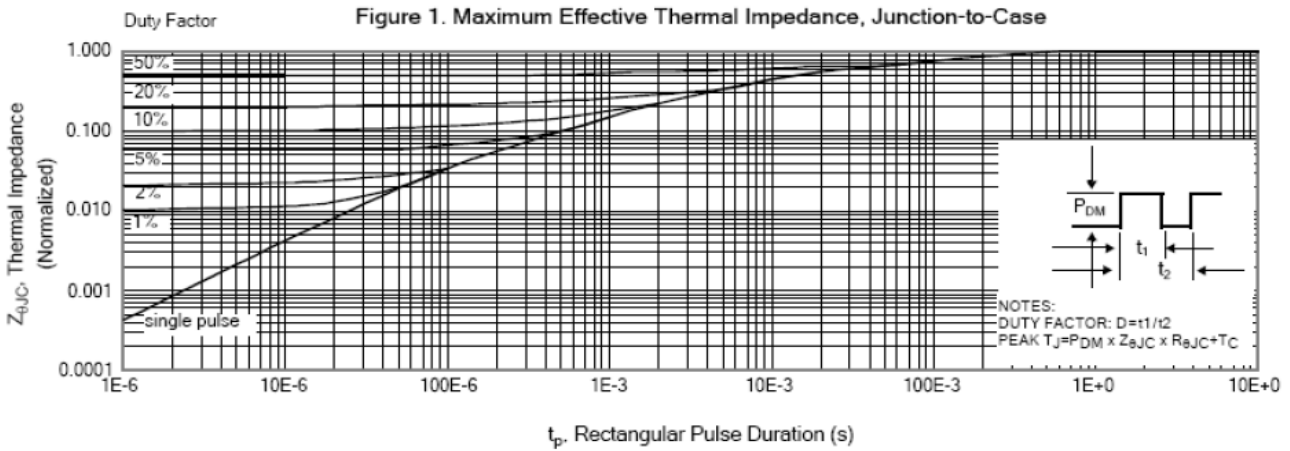


Figure 2. Maximum Power Dissipation vs Case Temperature

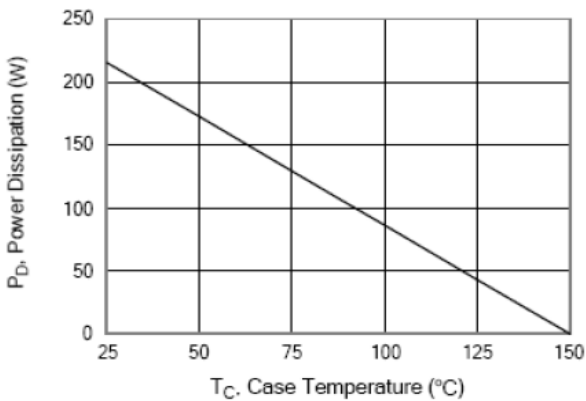


Figure 3. Maximum Continuous Drain Current vs Case Temperature

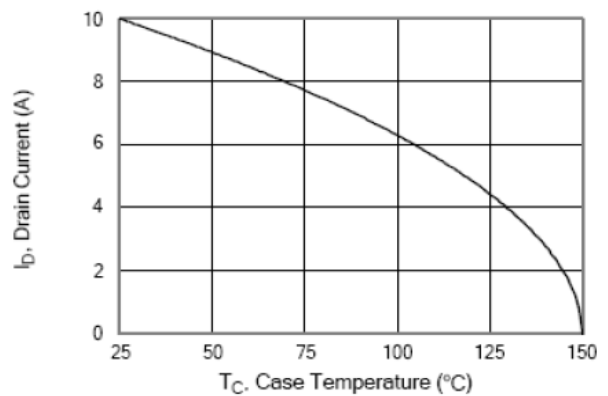


Figure 4. Typical Output Characteristics

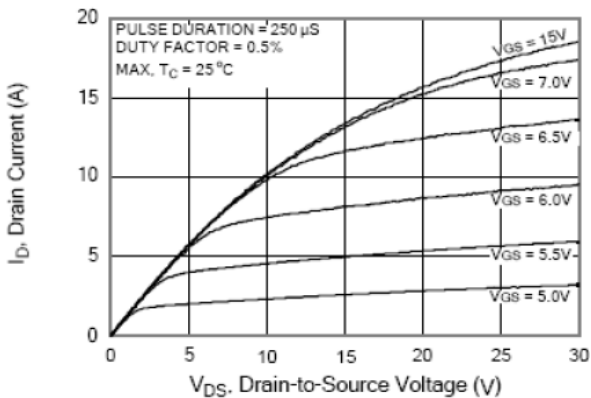
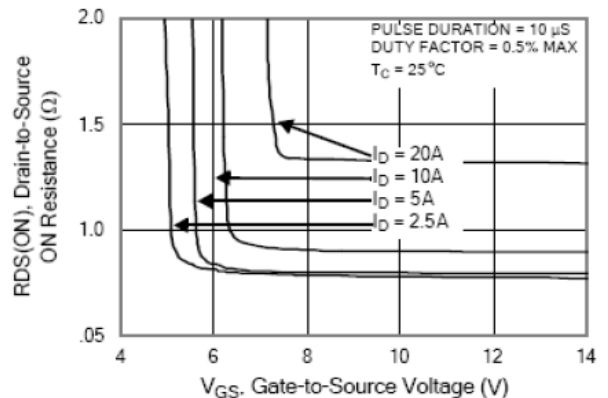


Figure 5. Typical Drain-to-Source ON Resistance vs Gate Voltage and Drain Current



Characteristic Curves(Cont.)

Figure 6. Maximum Peak Current Capability

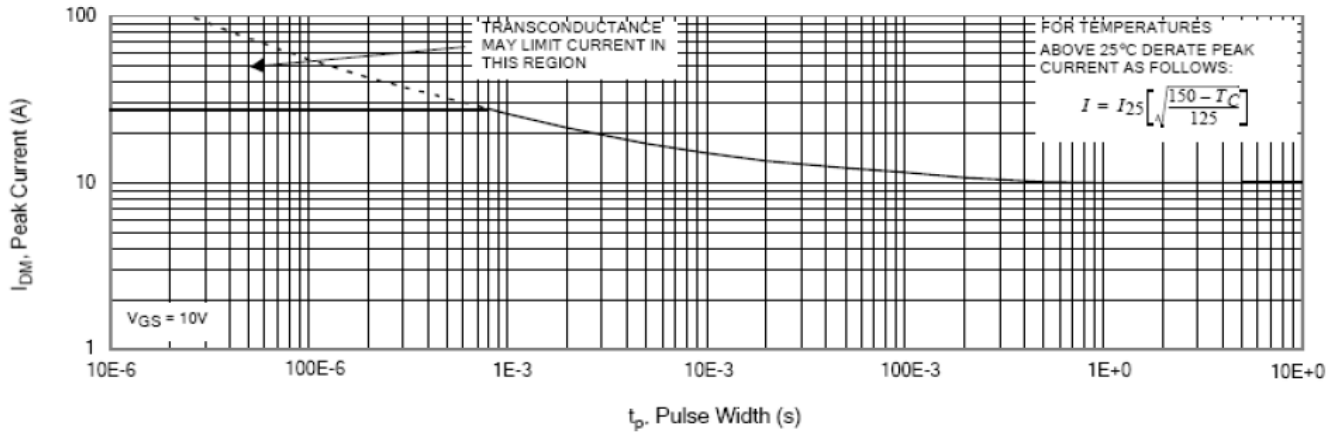


Figure 7. Typical Transfer Characteristics

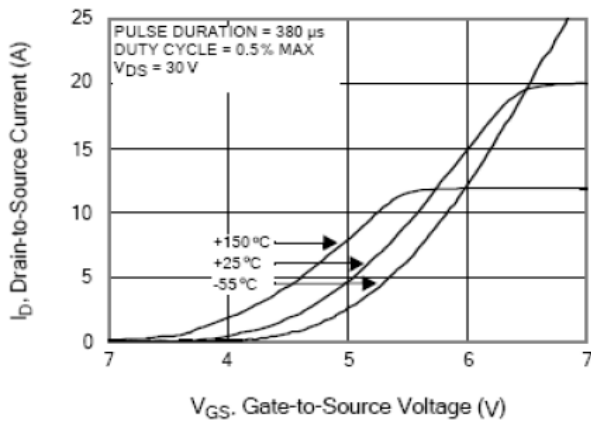


Figure 8. Unclamped Inductive Switching Capability

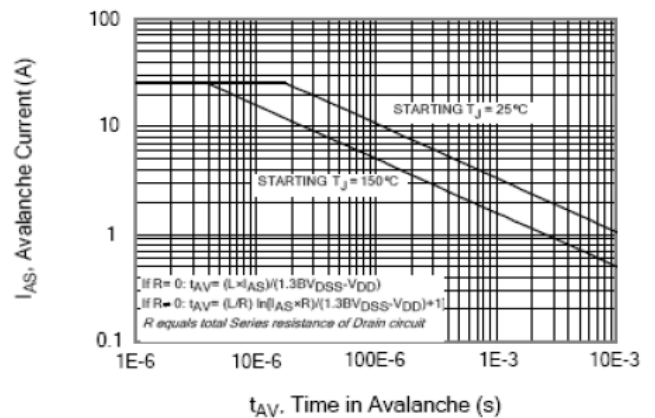


Figure 9. Typical Drain-to-Source ON Resistance vs Drain Current

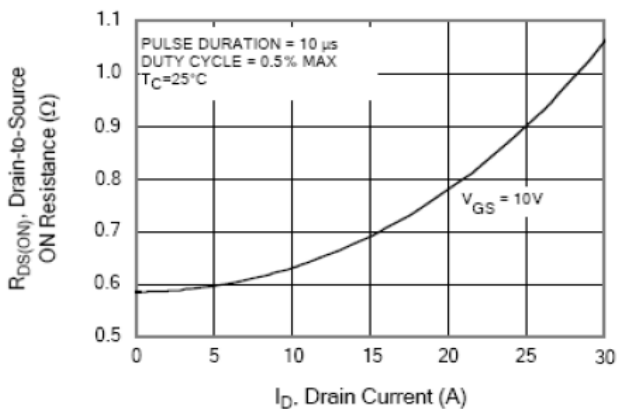
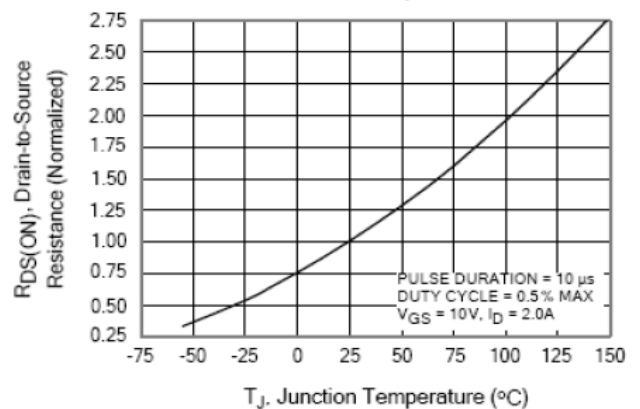


Figure 10. Typical Drain-to-Source ON Resistance vs Junction Temperature



Characteristic Curves(Cont.)

Figure 11. Typical Breakdown Voltage vs Junction Temperature

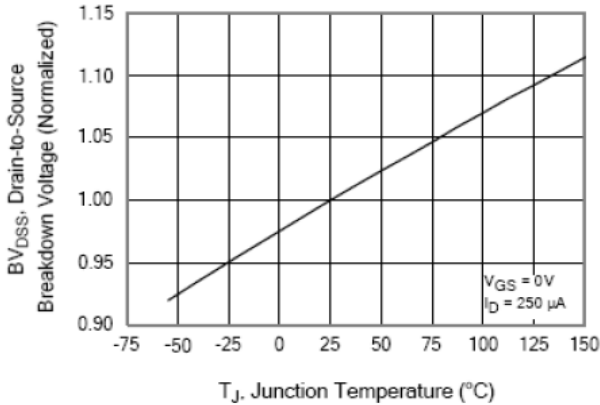


Figure 12. Typical Threshold Voltage vs Junction Temperature

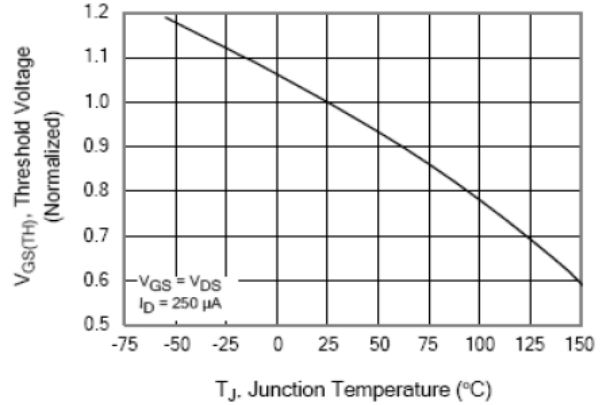


Figure 13. Maximum Forward Bias Safe Operating Area

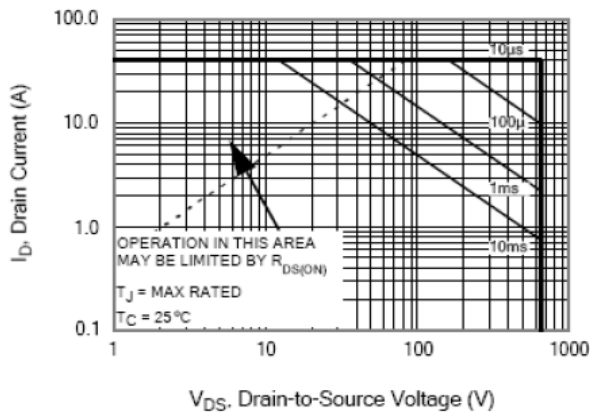


Figure 14. Typical Capacitance vs Drain-to-Source Voltage

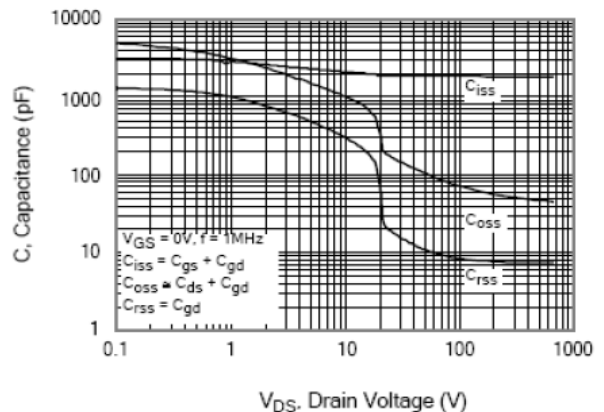


Figure 15. Typical Gate Charge vs Gate-to-Source Voltage

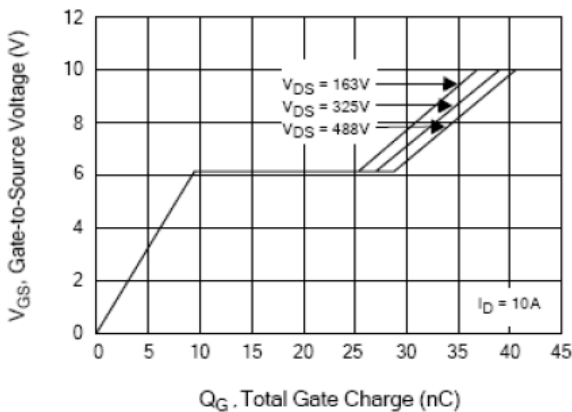
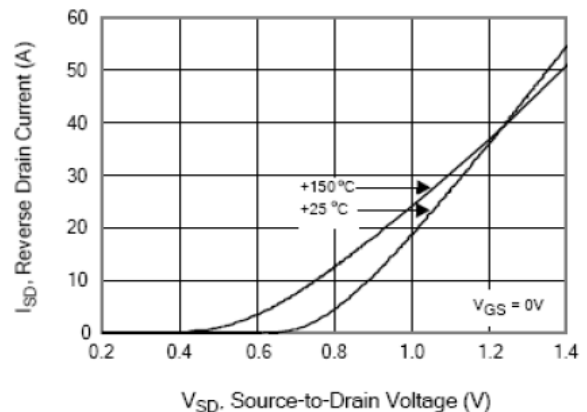


Figure 16. Typical Body Diode Transfer Characteristics



Test Circuit and Waveforms

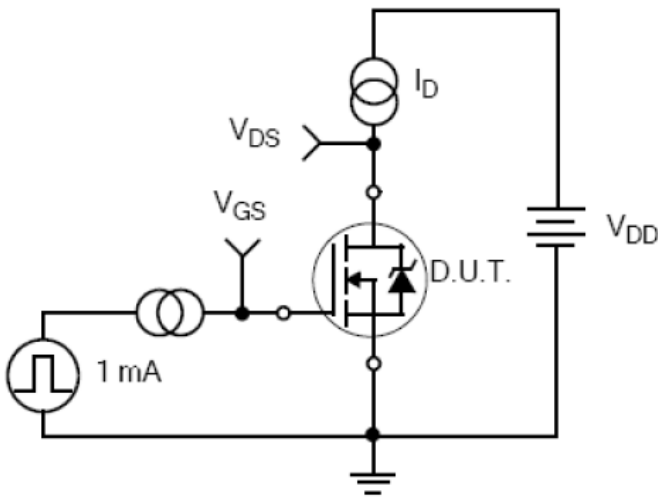


Figure 17. Gate Charge Test Circuit

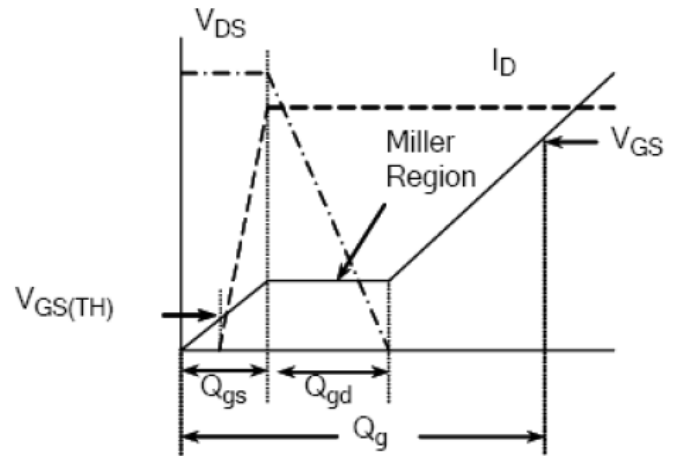


Figure 18. Gate Charge Waveform

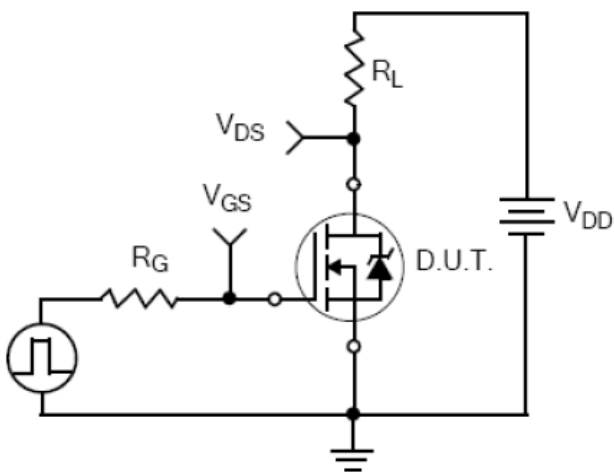


Figure 19. Resistive Switching Test Circuit

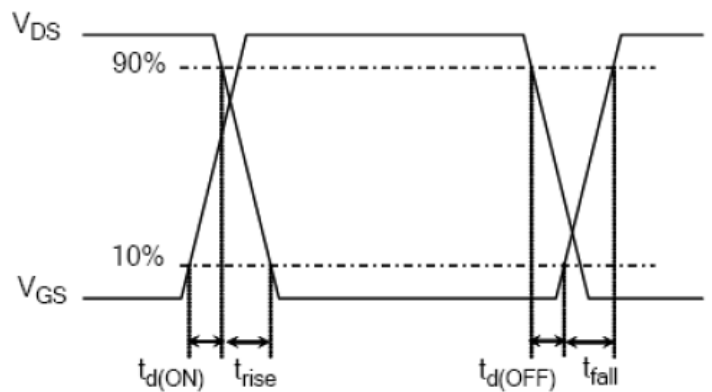


Figure 20. Resistive Switching Waveforms

Test Circuit and Waveforms(Cont.)

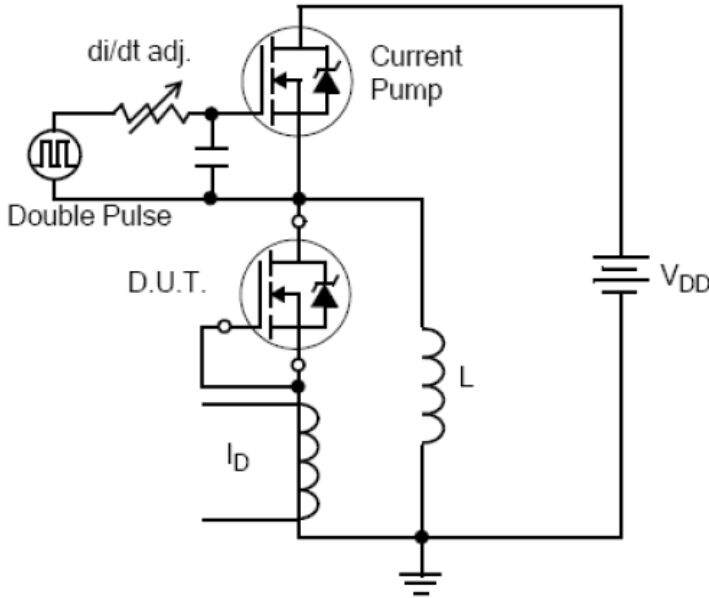


Figure 21. Diode Reverse Recovery Test Circuit

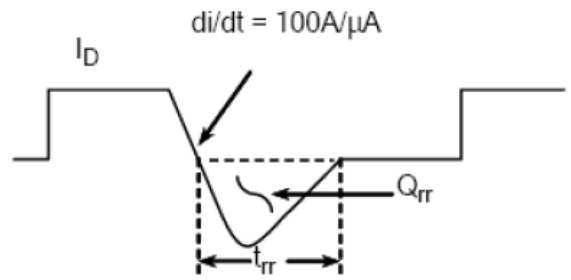


Figure 22. Diode Reverse Recovery Waveform

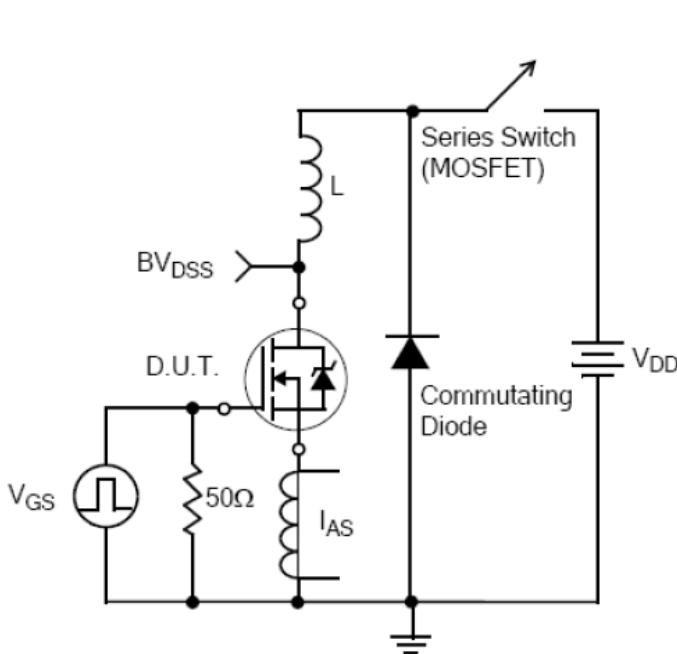


Figure 23. Unclamped Inductive Switching Test Circuit

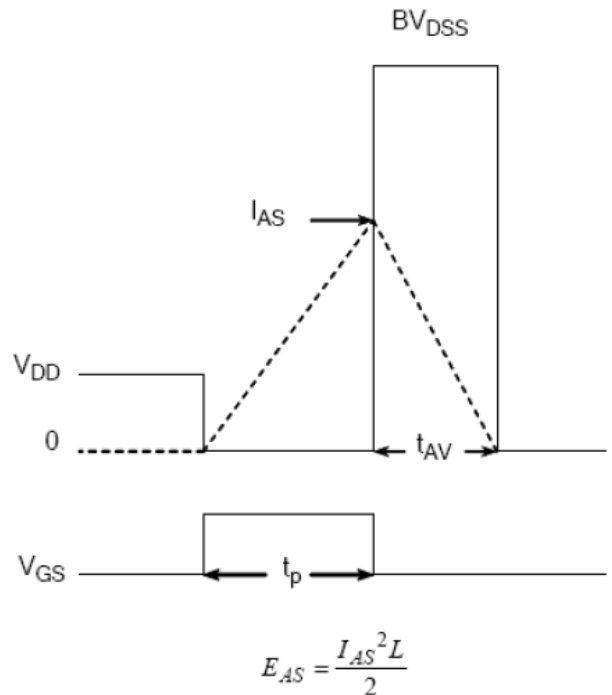
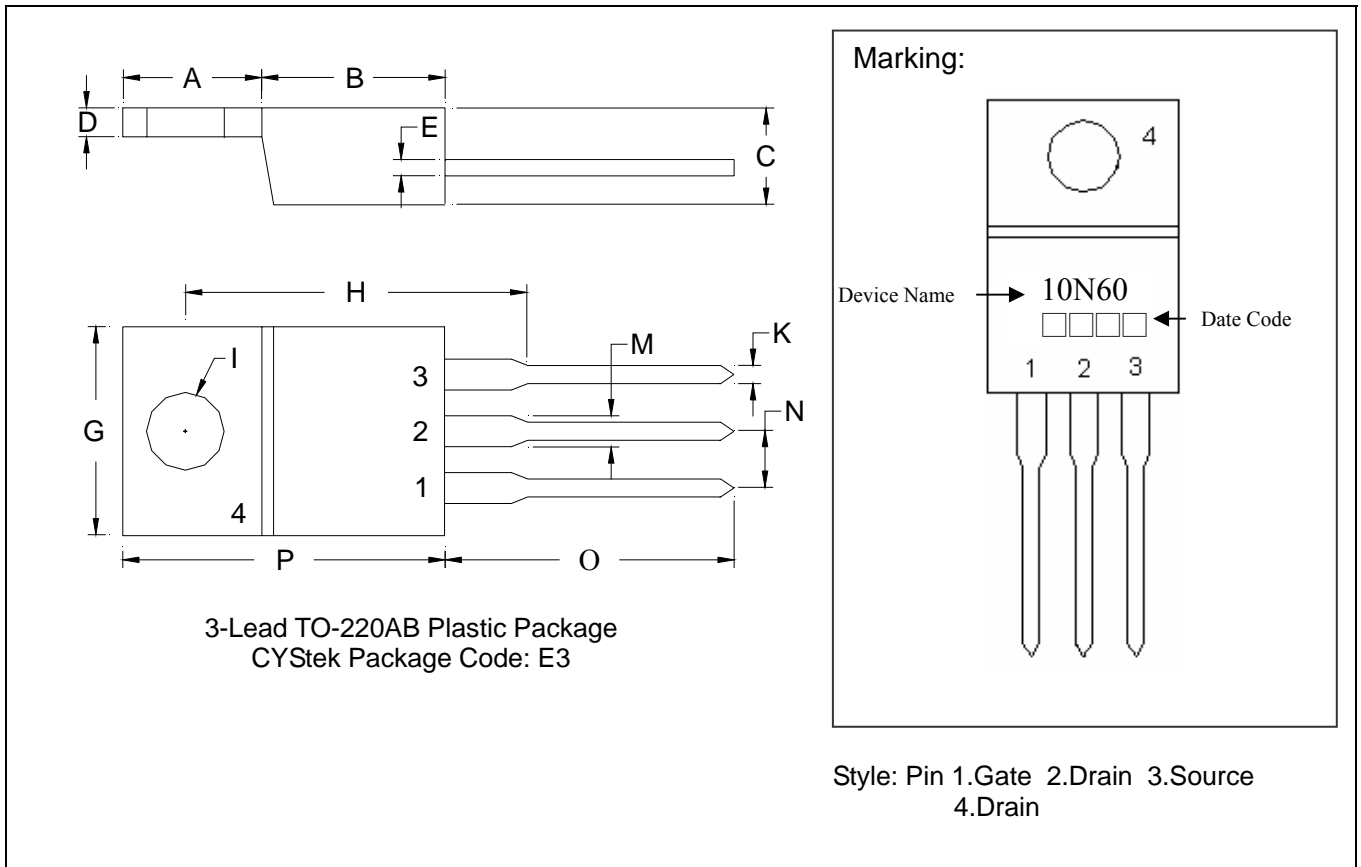


Figure 24. Unclamped Inductive Switching Waveforms

TO-220AB Dimension



*: Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.2441	0.2598	6.20	6.60	I	-	*0.1508	-	*3.83
B	0.3386	0.3543	8.60	9.00	K	0.0299	0.0394	0.76	1.00
C	0.1732	0.1890	4.40	4.80	M	0.0461	0.0579	1.17	1.47
D	0.0492	0.0571	1.25	1.45	N	-	*0.1000	-	*2.54
E	0.0142	0.0197	0.36	0.50	O	0.5217	0.5610	13.25	14.25
G	0.3858	0.4094	9.80	10.40	P	0.5787	0.6024	14.70	15.30
H	-	*0.6398	-	*16.25					

Notes: 1.Controlling dimension: millimeters.
 2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.
 3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: KFC ; pure tin plated
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

Important Notice:

- All rights are reserved. Reproduction in whole or in part is prohibited without the prior written approval of CYStek.
- CYStek reserves the right to make changes to its products without notice.
- CYStek **semiconductor products are not warranted to be suitable for use in Life-Support Applications, or systems.**
- CYStek assumes no liability for any consequence of customer product design, infringement of patents, or application assistance.