N-Channel Enhancement Mode Power MOSFET

MTN8N60E3

BV_{DSS} : 650V @Tj=150℃
$R_{DS(ON)}$: 1.2Ω (max.)
I_D : 7.5A

Description

The MTN8N60E3 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

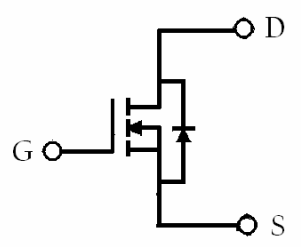
- BV_{DSS}=650V typically @ Tj=150℃
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Applications

- Switching Mode Power Supply
- LCD Panel Power
- Adapter
- E-bike Charger

Symbol

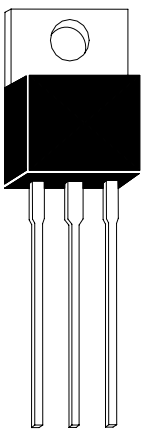
MTN8N60E3



G：Gate
D：Drain
S：Source

Outline

TO-220



G D S

Absolute Maximum Ratings (T_C=25°C)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	±30	V
Continuous Drain Current	I_D	7.5*	A
Continuous Drain Current @T_C=100°C	I_D	4.5*	A
Pulsed Drain Current @ V_{GS}=10V (Note 1)	I_{DM}	30*	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	230	mJ
Avalanche Current (Note 1)	I_{AR}	7.5	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	14.7	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	4.5	V/ns
Maximum Temperature for Soldering @ Lead at 0.125 in(0.318mm) from case for 10 seconds	T_L	300	°C
Total Power Dissipation (T_C=25℃)	Pd	147	W
Linear Derating Factor		1.18	W/°C
Operating Junction and Storage Temperature	Tj, Tstg	-55~+150	°C

*Drain current limited by maximum junction temperature

Note : 1.Repetitive rating; pulse width limited by maximum junction temperature.
2. I_{AS}≤7.5A, V_{DD}=50V, L=7.5mH, V_G=10V, starting T_J=+25℃.
3. I_{SD}≤7.5A, dI/dt≤200A/μs, V_{DD}≤BV_{DSS}, starting T_J=+25℃.

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	0.85	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62.5	°C/W

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	600	-	-	V	V_{GS}=0, I_D=250μA, Tj=25℃
BV_{DSS}	-	650	-	V	V_{GS}=0, I_D=250μA, Tj=150℃
$\Delta BV_{DSS}/\Delta Tj$	-	0.65	-	V/°C	Reference to 25°C, I_D=250μA
BV_{DS}	-	700	-	V	V_{GS}=0, I_D=7.5A
$V_{GS(th)}$	2.0	-	4.0	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	10	-	S	V_{DS} =15V, I_D=3.75A
I_{GSS}	-	-	±100	nA	V_{GS}=±30
I_{DSS}	-	-	1	μA	V_{DS} =600V, V_{GS} =0
	-	-	10	μA	V_{DS} =480V, V_{GS} =0, T_C=125°C
*$R_{DS(ON)}$	-	-	1.2	Ω	V_{GS} =10V, I_D=3.75A
Dynamic					
*Qg	-	31.3	-	nC	I_D=6A, V_{DD}=300V, V_{GS}=10V
*Qgs	-	6.9	-		
*Qgd	-	14	-		
*$t_{d(ON)}$	-	14.2	-	ns	V_{DD}=300V, I_D=6A, V_{GS}=10V, R_G=10Ω, R_D=50Ω
*tr	-	11.8	-		
*$t_{d(OFF)}$	-	40.1	-		
*t_f	-	18.8	-		
Ciss	-	1482	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	121.7	-		
Crss	-	14	-		
Source-Drain Diode					
*V_{SD}	-	-	1.5	V	I_S=7.5A, V_{GS}=0V
*I_S	-	-	7.5	A	
*I_{SM}	-	-	30		
*trr	-	504.9	-	ns	V_{GS}=0, I_F=6A, dI/dt=100A/μs
*Qrr	-	47.59	-	μC	

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

Ordering Information

Device	Package	Shipping	Marking
MTN8N60E3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton	8N60

Characteristic Curves

Figure 1. On-Region Characteristics

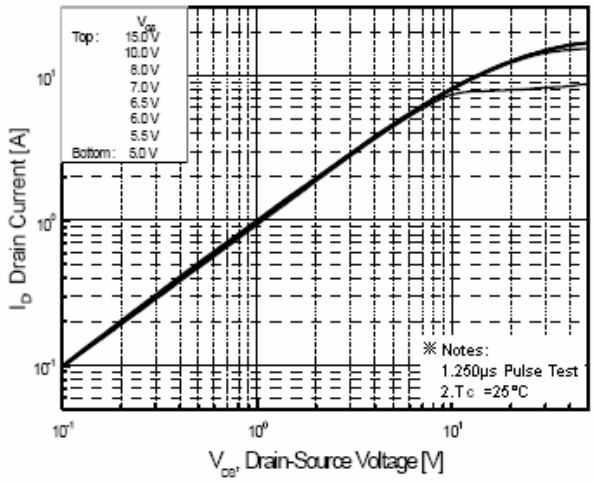


Figure 2. Transfer Characteristics

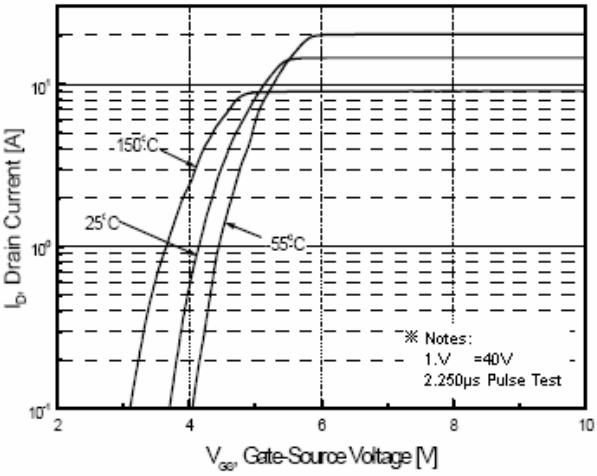


Figure 3. On-Resistance Variation vs Drain Current and Gate Voltage

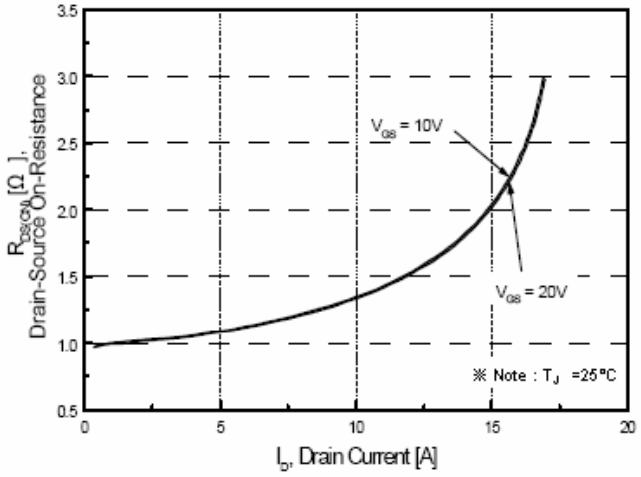


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

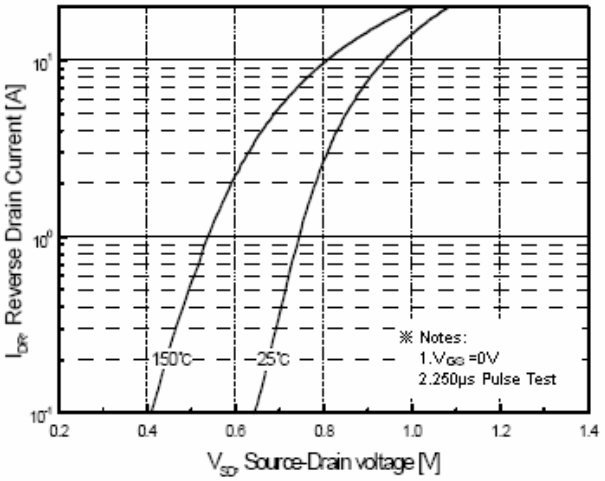


Figure 5. Capacitance Characteristics

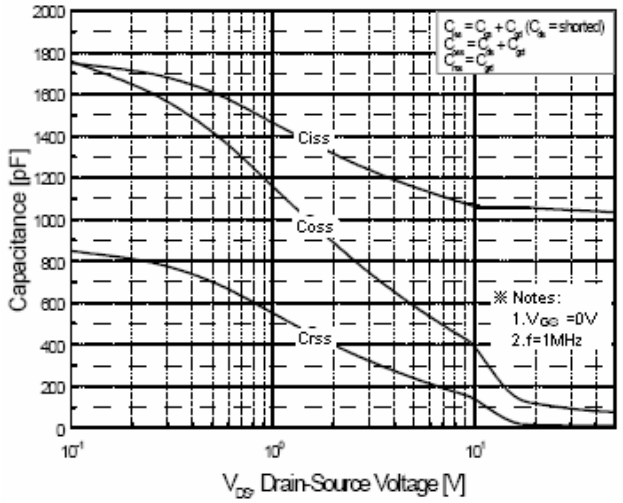
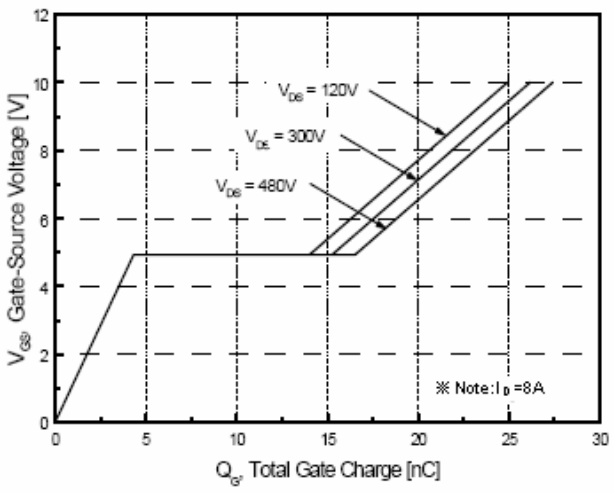


Figure 6. Gate Charge Characteristics



Characteristic Curves(Cont.)

Figure 7. Breakdown Voltage Variation vs Temperature

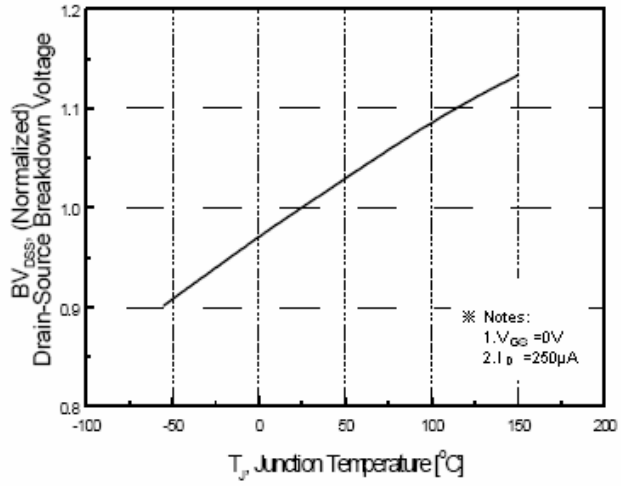


Figure 8. On-Resistance Variation vs Temperature

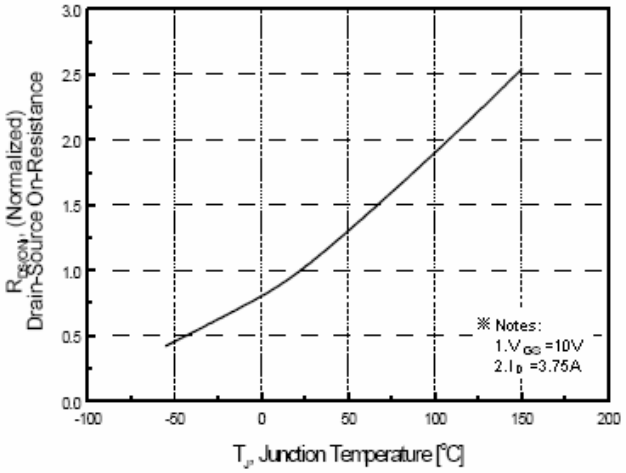


Figure 9. Maximum Safe Operating Area

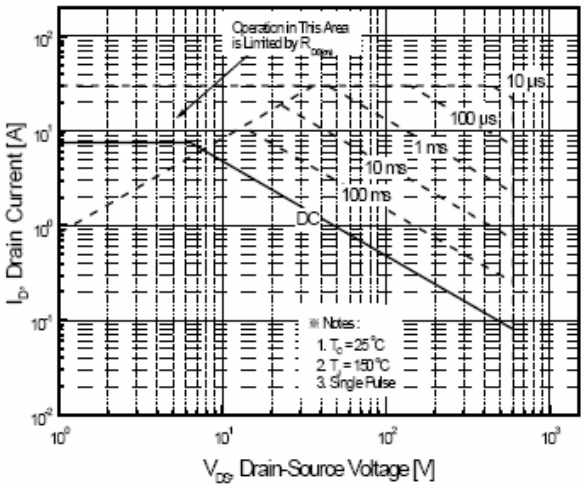
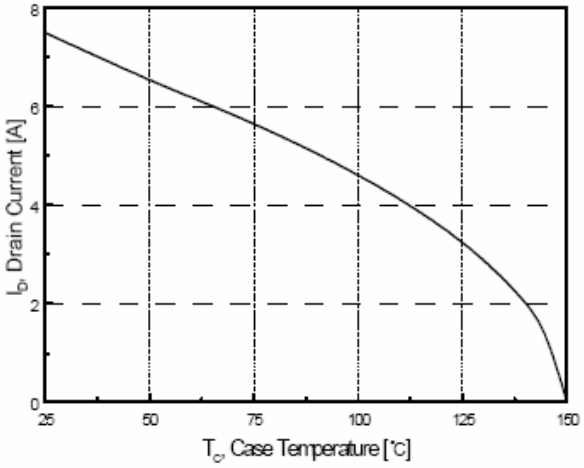


Figure 10. Maximum Drain Current vs Case Temperature



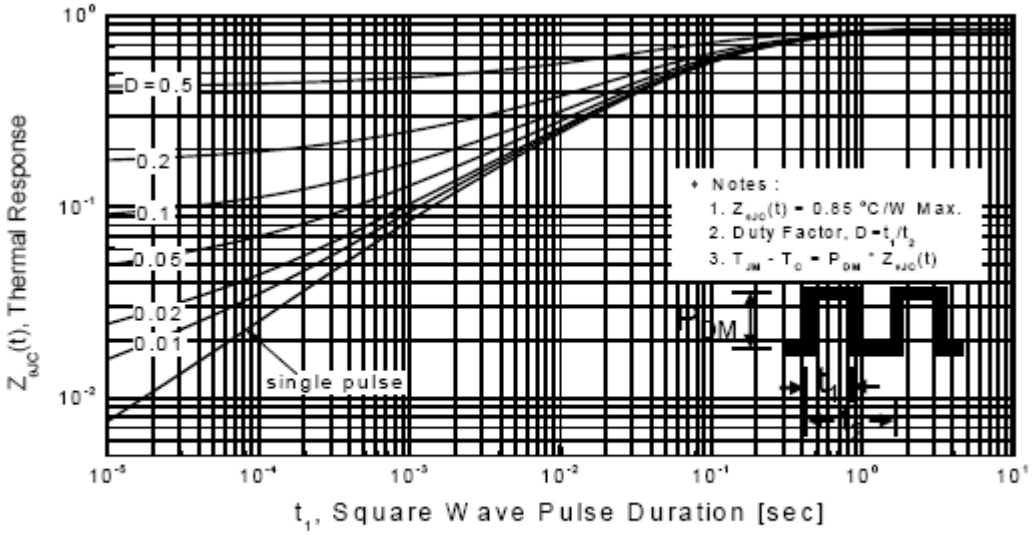
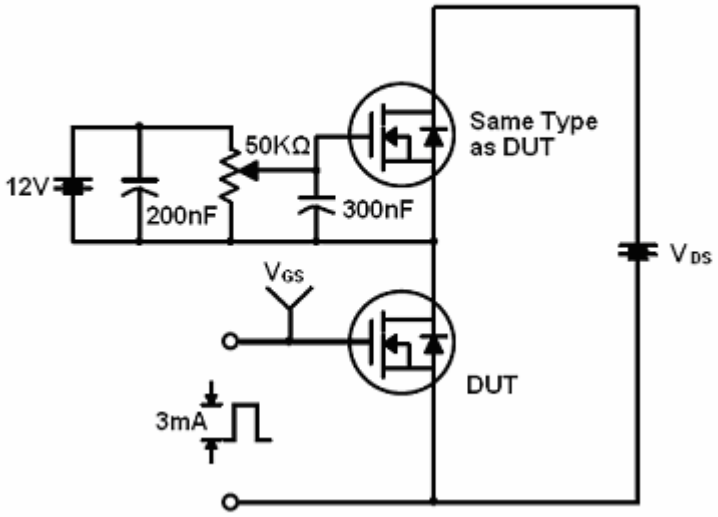
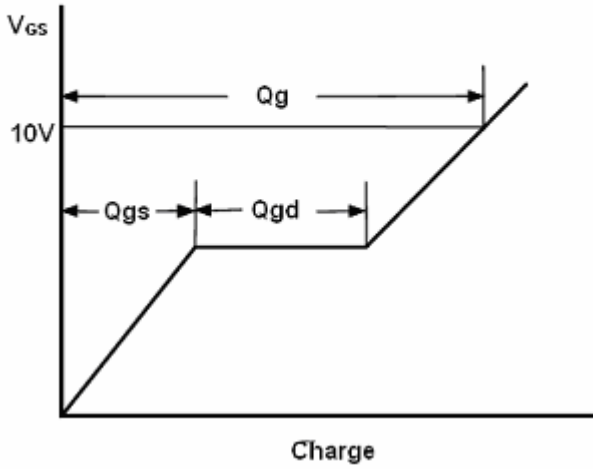


Figure 11. Transient Thermal Response Curve

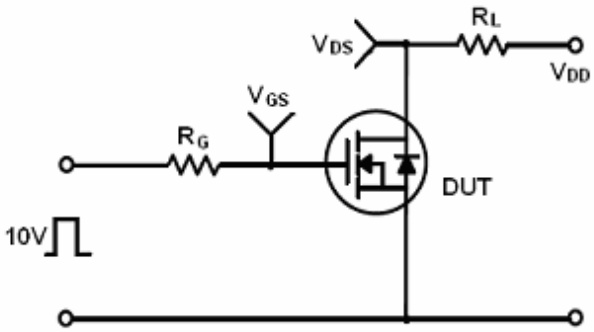
Test Circuit and Waveforms

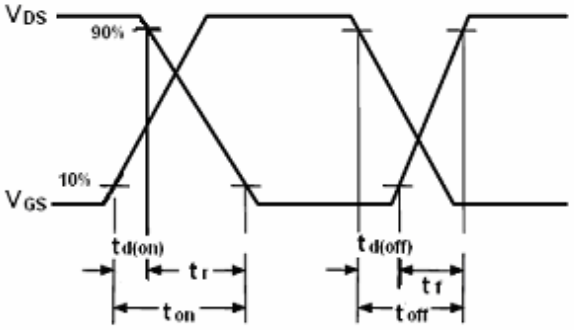
Gate Charge Test Circuit & Waveforms



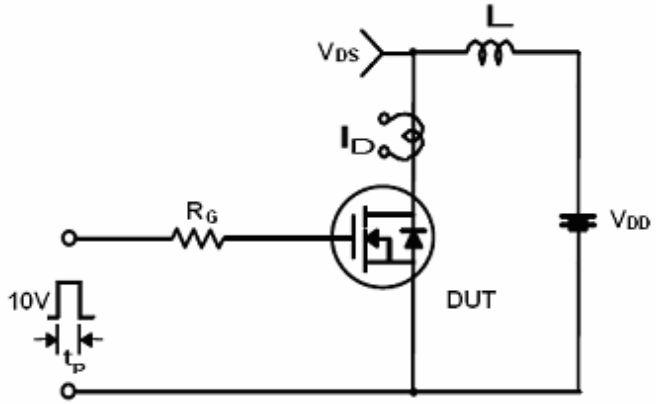


Resistive Switching Test Circuit & Waveforms

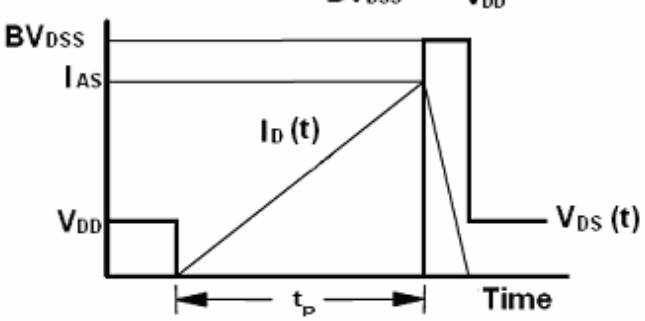




Unclamped Inductive Switching Test Circuit & Waveforms

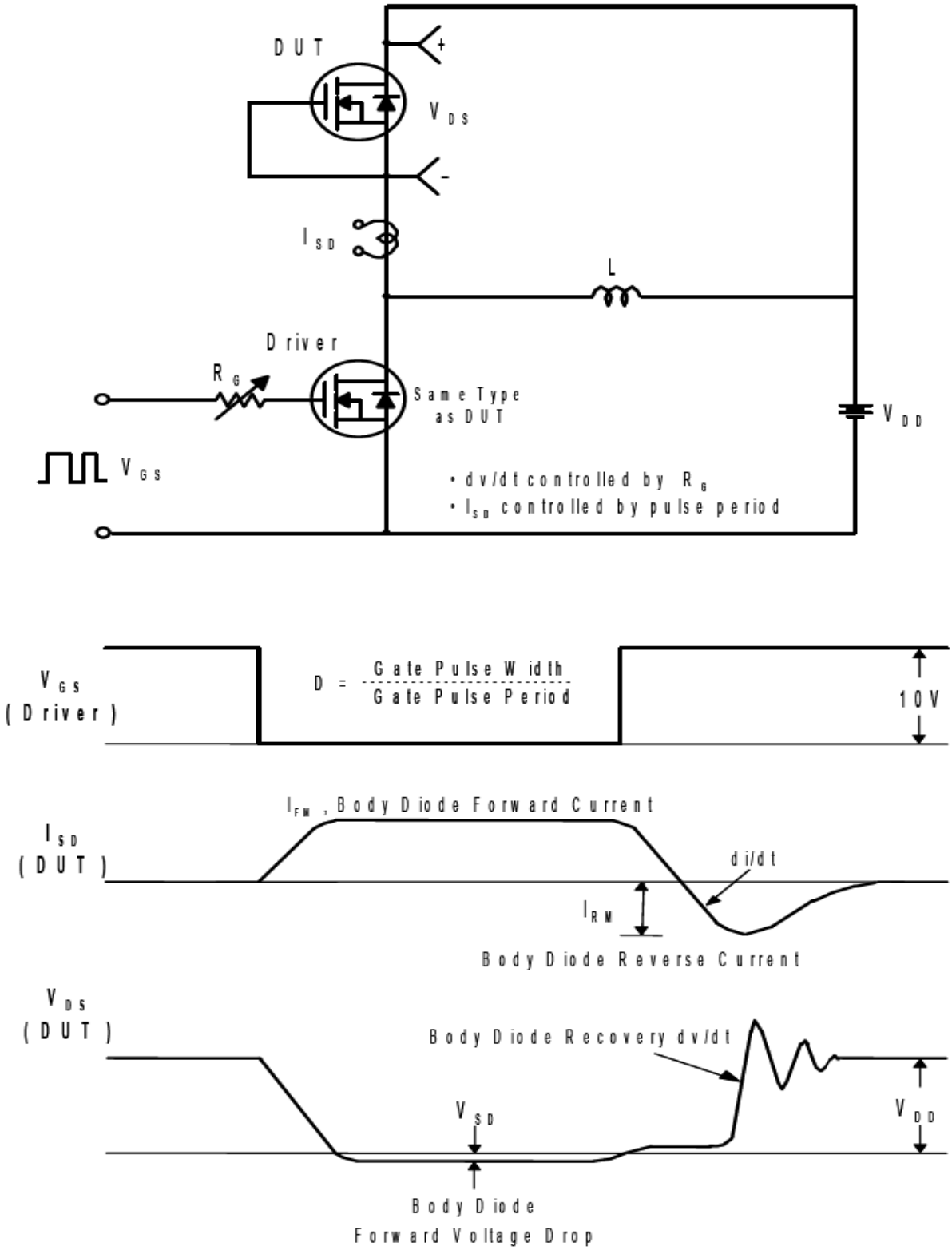


$$E_{AS} = \frac{1}{2} LI_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$

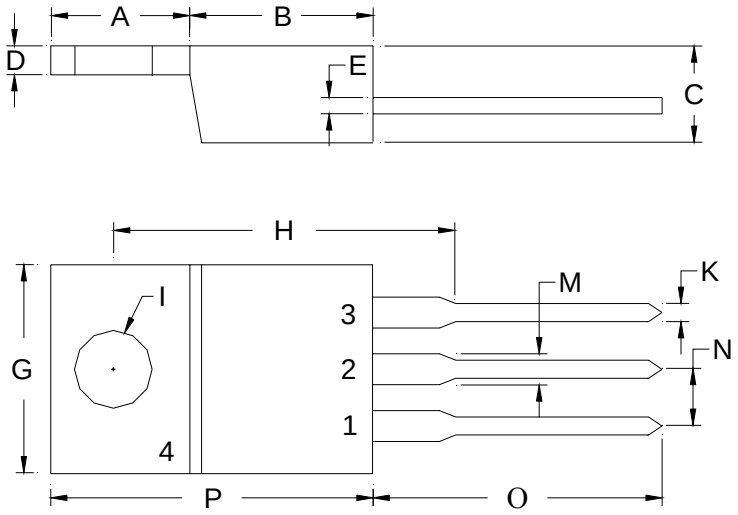


Test Circuit and Waveforms(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms

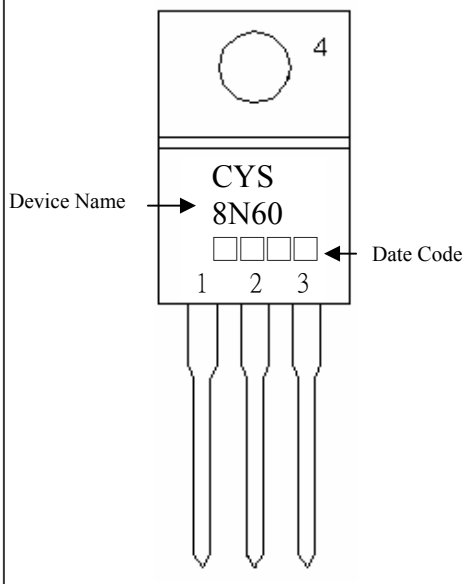


TO-220 Dimension



3-Lead TO-220 Plastic Package
CYStek Package Code: E3

Marking:



Style: Pin 1.Gate 2.Drain 3.Source
4.Drain

*: 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

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