

N-Channel Enhancement Mode Power MOSFET**MTN4N60AE3** **BV_{DS} : 600V** **$R_{DS(ON)}$: 2.8 Ω (typ.)** **I_D : 4A****Description**

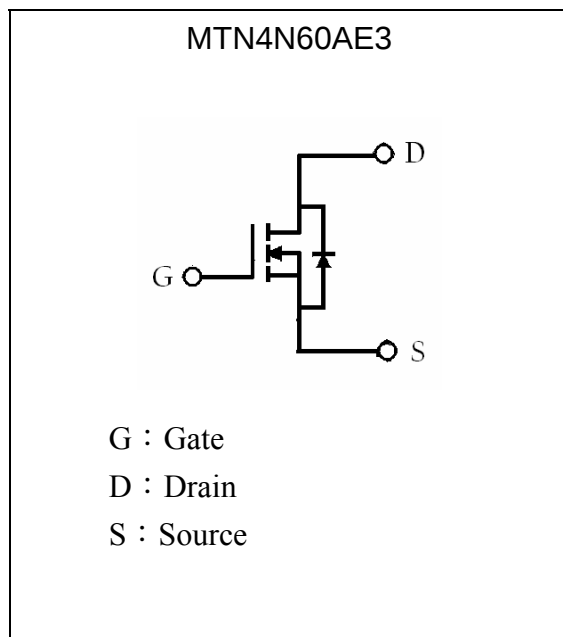
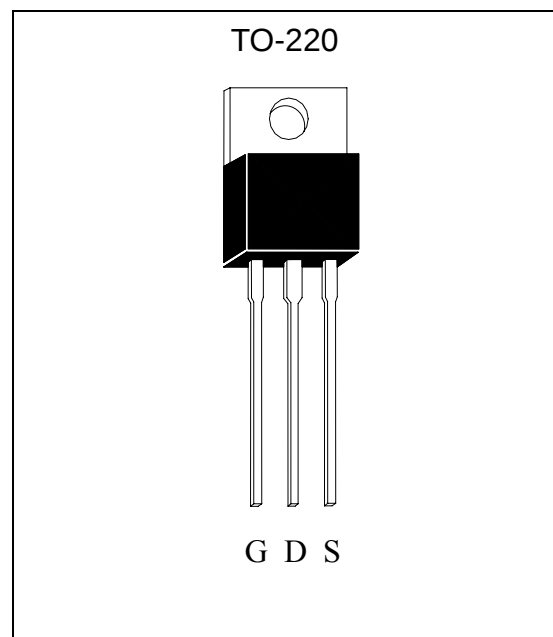
The MTN4N60AE3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220 package is universally preferred for all commercial-industrial applications

Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Applications

- Open Framed Power Supply
- Adapter
- STB

Symbol**Outline**

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

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	600	V
Gate-Source Voltage	V_{GS}	± 30	V
Continuous Drain Current	I_D	4*	A
Continuous Drain Current @ $T_C=100^{\circ}\text{C}$	I_D	2.4*	A
Pulsed Drain Current @ $V_{GS}=10\text{V}$ (Note 1)	I_{DM}	16*	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	69.8	mJ
Avalanche Current (Note 1)	I_{AR}	4	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	8.3	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	$^{\circ}\text{C}$
Maximum Temperature for Soldering @ Package Body for 10 seconds	T_{PKG}	260	$^{\circ}\text{C}$
Total Power Dissipation ($T_C=25^{\circ}\text{C}$) Linear Derating Factor	P_d	83	W
		0.66	W/ $^{\circ}\text{C}$
Operating Junction and Storage Temperature	T_j, T_{stg}	-55~+150	$^{\circ}\text{C}$

*Drain current limited by maximum junction temperature

Note : 1.Repetitive rating; pulse width limited by maximum junction temperature.

2. $I_{AS}=4\text{A}$, $V_{DD}=50\text{V}$, $L=8\text{mH}$, $V_G=10\text{V}$, starting $T_J=+25^{\circ}\text{C}$.3. $I_{SD}\leq 4\text{A}$, $dI/dt\leq 100\text{A}/\mu\text{s}$, $V_{DD}\leq BV_{DSS}$, starting $T_J=+25^{\circ}\text{C}$.**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1.5	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62.5	$^{\circ}\text{C}/\text{W}$

**Characteristics (Tc=25°C, unless otherwise specified)**

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	600	-	-	V	V _{GS} =0, I _D =250μA, T _j =25°C
ΔBV _{DSS} /ΔT _j	-	0.6	-	V/°C	Reference to 25°C, I _D =250μA
V _{GS(th)}	2.0	-	4.0	V	V _{DS} = V _{GS} , I _D =250μA
*G _{FS}	-	2	-	S	V _{DS} =15V, I _D =2A
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 _j =125°C
*R _{DS(ON)}	-	2.8	3.2	Ω	V _{GS} =10V, I _D =2A
Dynamic					
*Q _g	-	13.6	-	nC	I _D =4A, V _{DD} =480V, V _{GS} =10V
*Q _{gs}	-	2.8	-		
*Q _{gd}	-	6	-		
*t _{d(ON)}	-	19	-	ns	V _{DD} =300V, I _D =4A, V _{GS} =10V, R _G =25 Ω , R _D =75 Ω
*t _r	-	40	-		
*t _{d(OFF)}	-	38	-		
*t _f	-	36	-		
C _{iss}	-	565	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{oss}	-	52	-		
C _{rss}	-	9.2	-		
Source-Drain Diode					
*V _{SD}	-	-	1.5	V	I _S =4A, V _{GS} =0V
*I _S	-	-	4	A	
*I _{SM}	-	-	16		
*t _{rr}	-	290	-	ns	V _{GS} =0, I _F =4A, dI/dt=100A/μs
*Q _{rr}	-	2	-	μC	

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

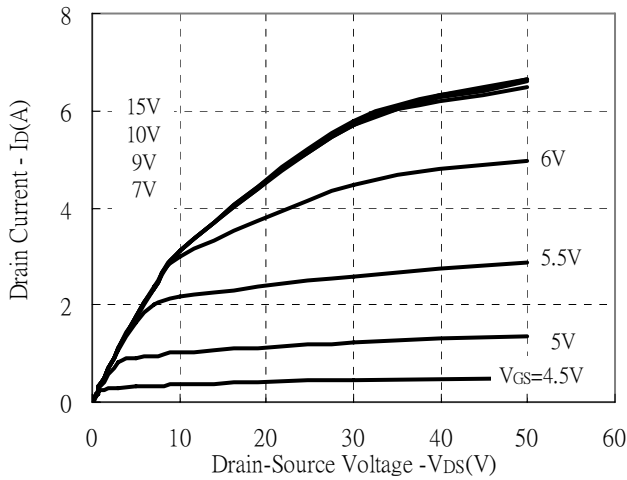
Ordering Information

Device	Package	Shipping
MTN4N60AE3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton

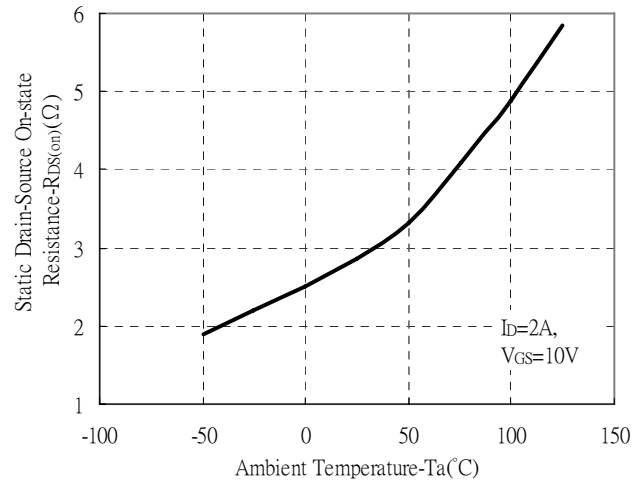


Typical Characteristics

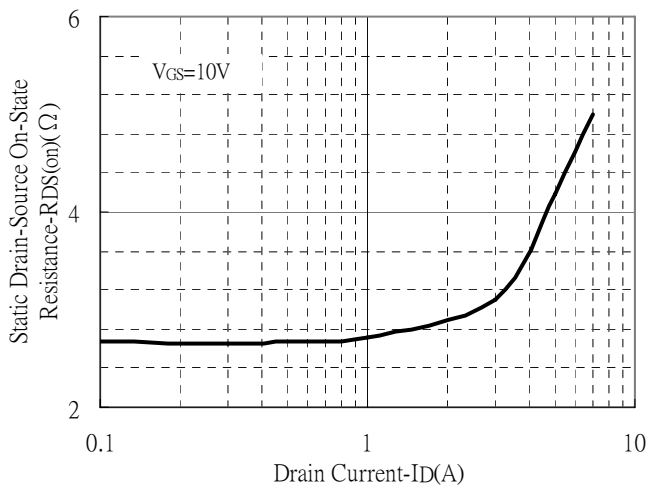
Typical Output Characteristics



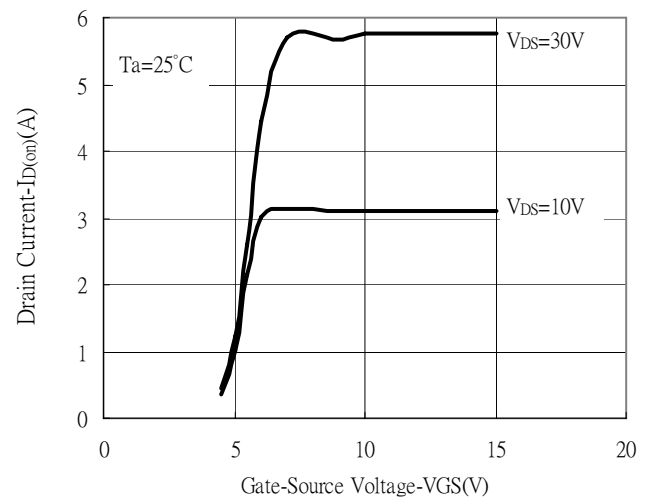
Static Drain-Source On-resistance vs Ambient Temperature



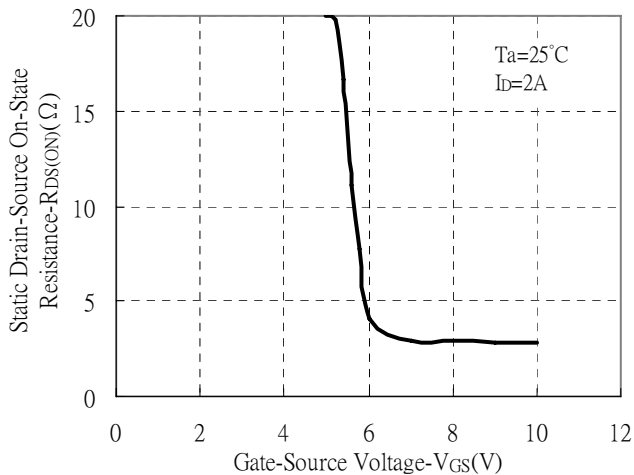
Static Drain-Source On-State resistance vs Drain Current



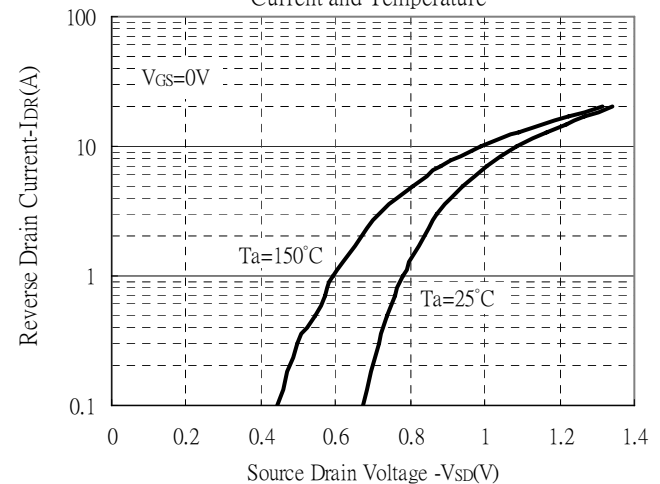
Drain Current vs Gate-Source Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage



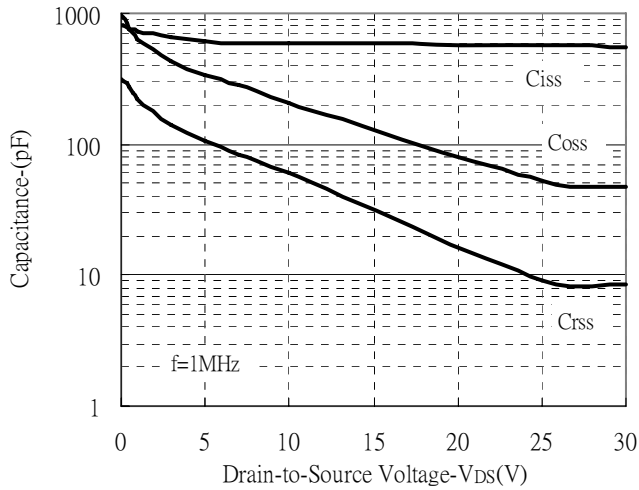
Body Diode Forward Voltage Variation vs Source Current and Temperature



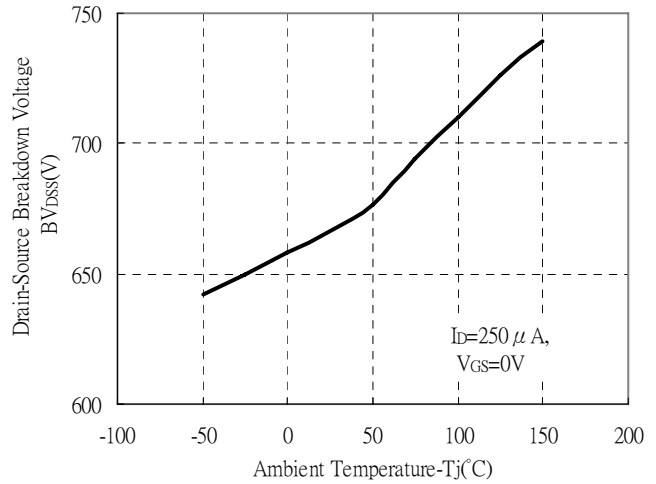


Typical Characteristics(Cont.)

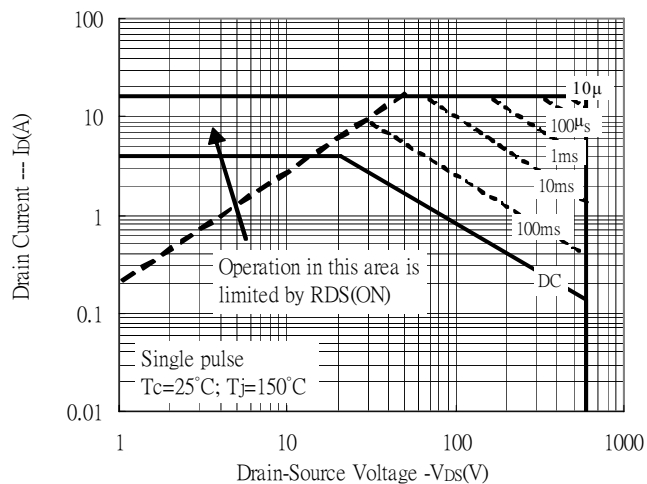
Capacitance vs Reverse Voltage



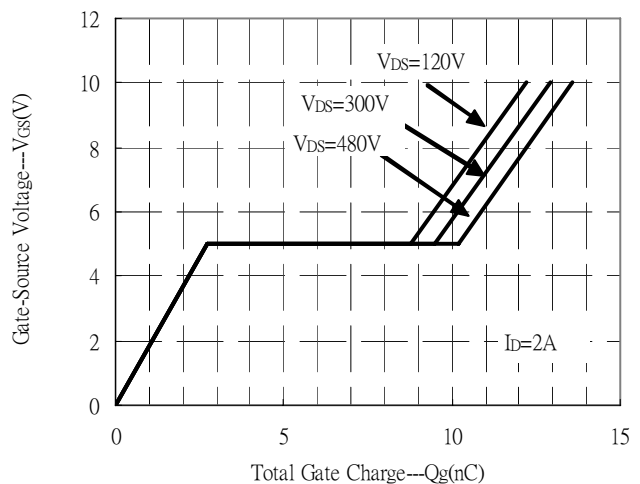
Breakdown Voltage vs Ambient Temperature



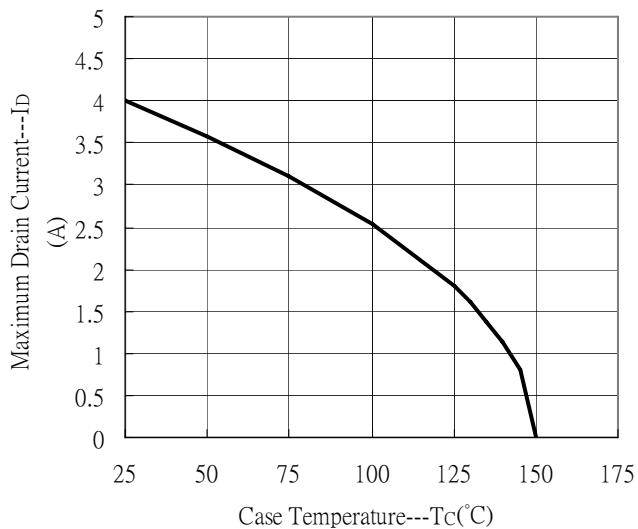
Maximum Safe Operating Area



Gate Charge Characteristics

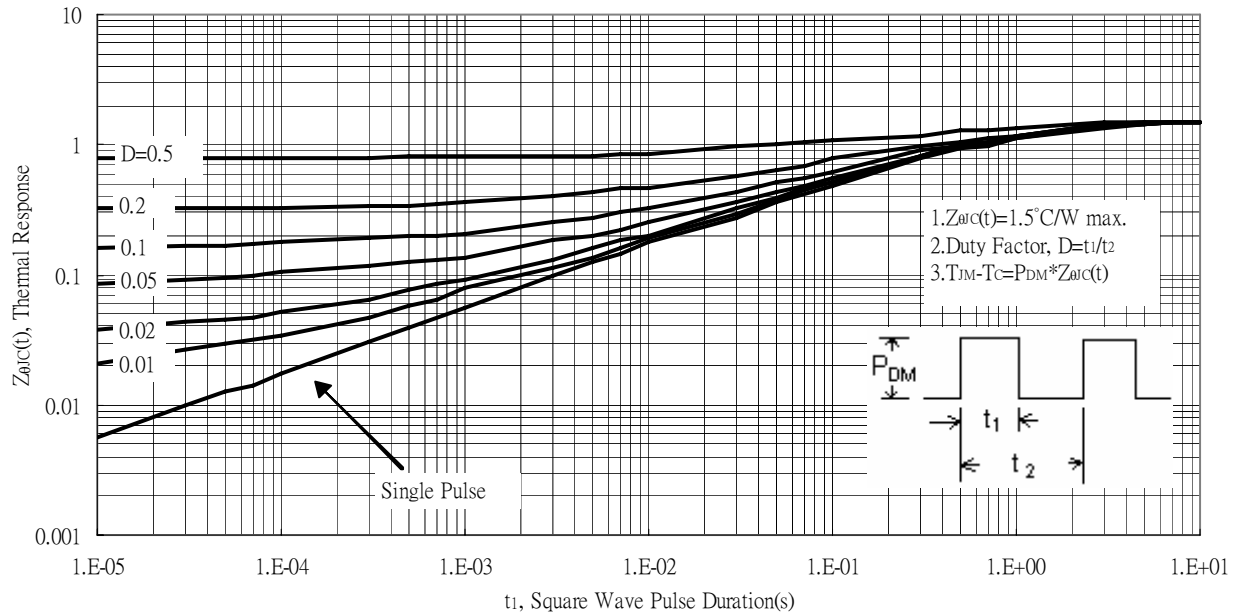


Maximum Drain Current vs Case Temperature



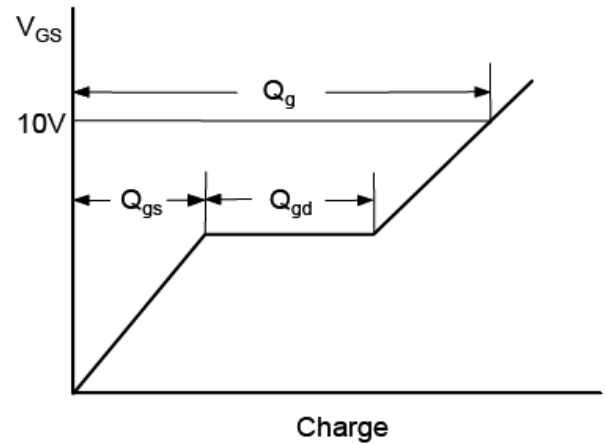
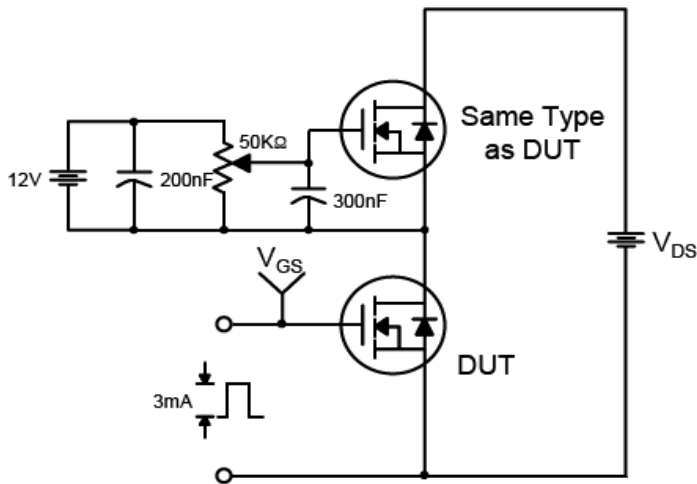
Typical Characteristics(Cont.)

Transient Thermal Response Curves

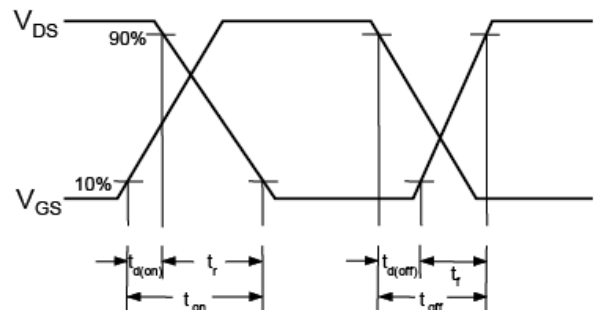
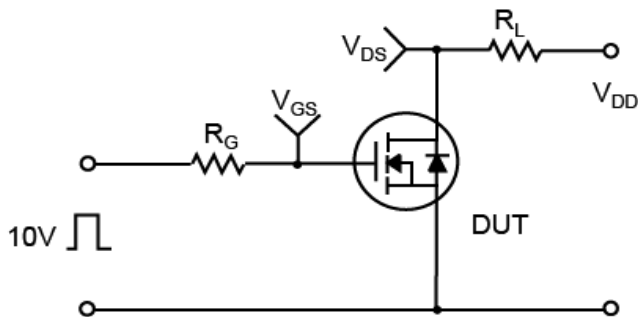


Test Circuits and Waveforms

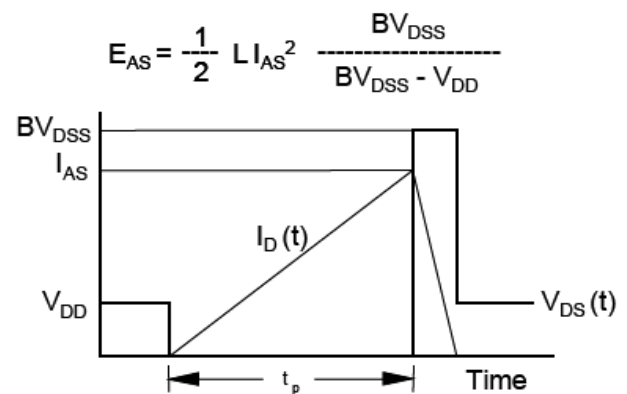
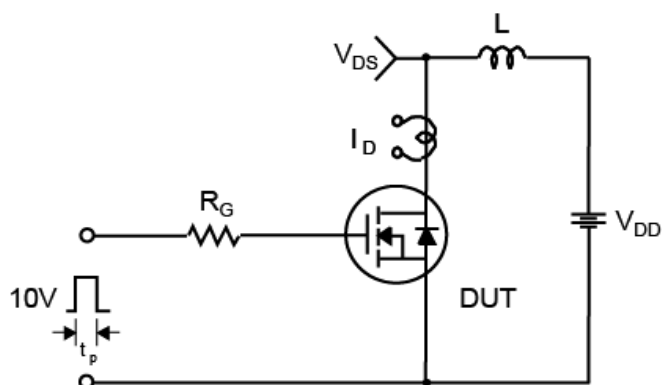
Gate Charge Test Circuit & Waveform

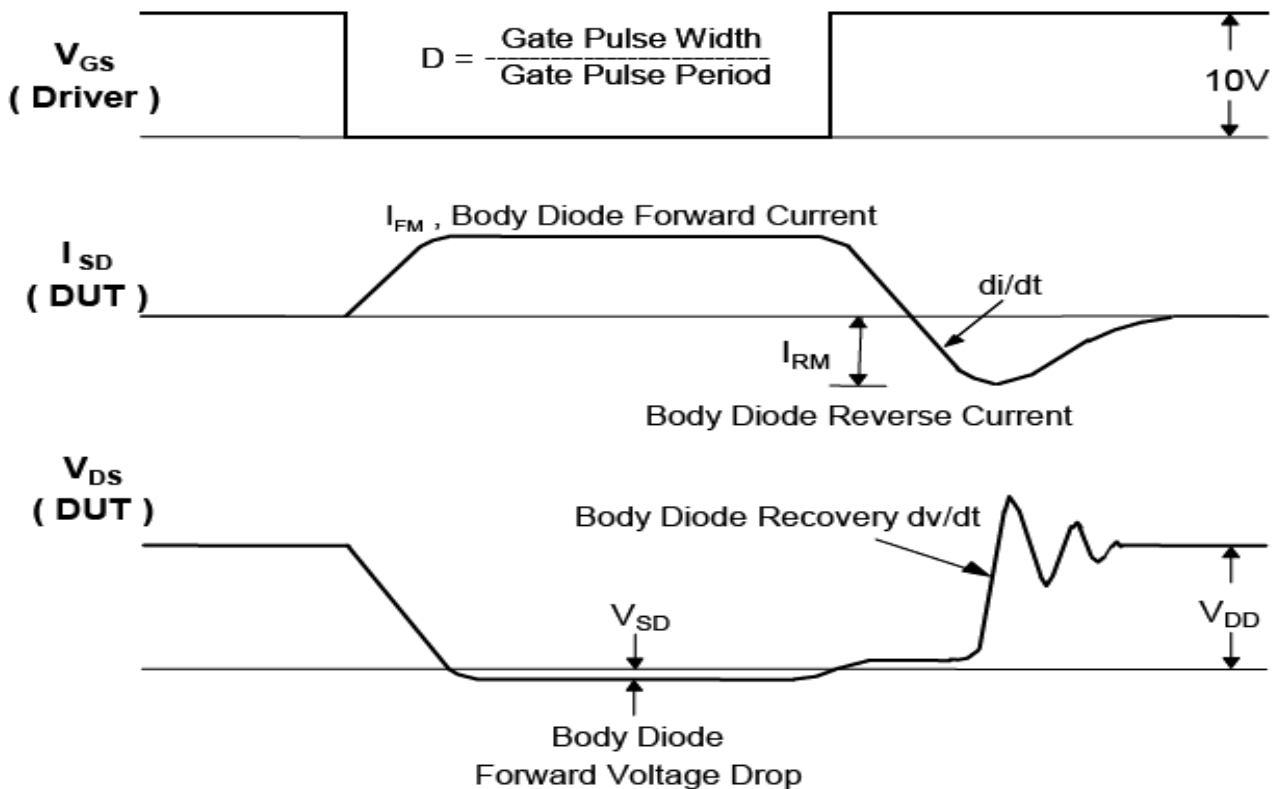
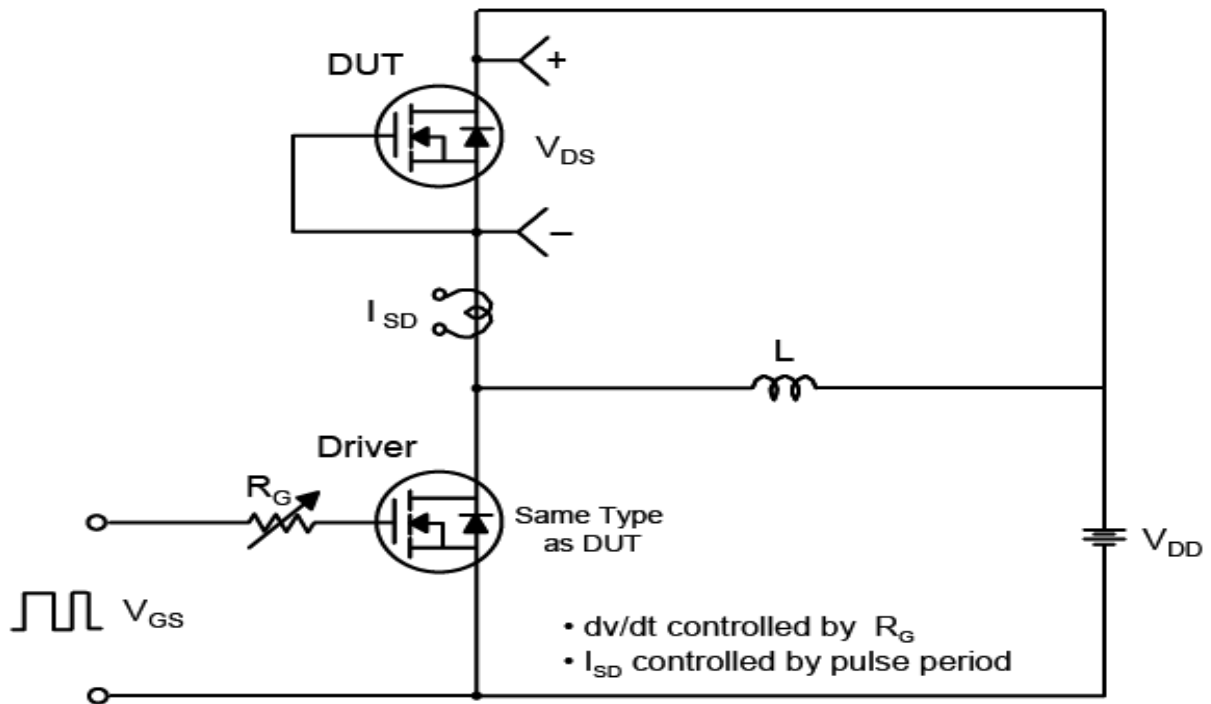


Resistive Switching Test Circuit & Waveforms

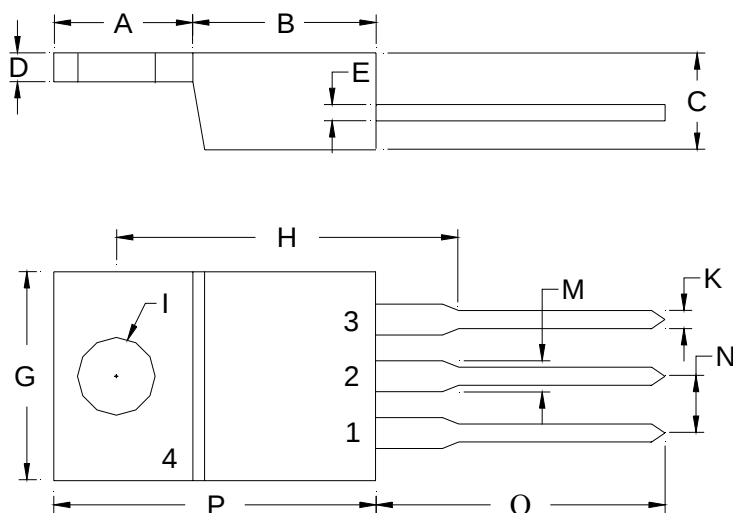


Unclamped Inductive Switching Test Circuit & Waveforms



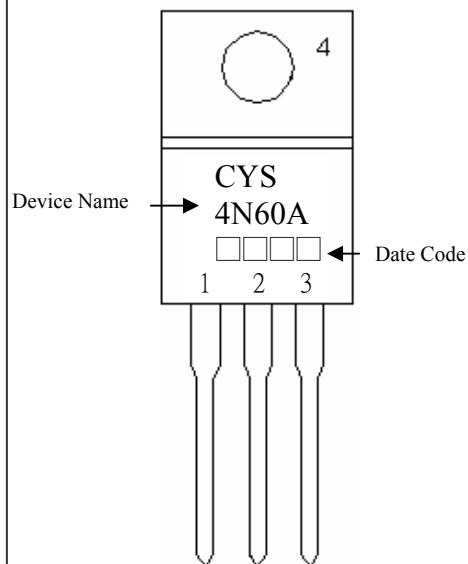
Test Circuits and Waveforms(Cont.)
Peak Diode Recovery dv/dt Test Circuit & Waveforms


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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