N-Channel Enhancement Mode Power MOSFET

MTN4N60FI

BV_{DSS} : 600V
$R_{DS(ON)}$: 2.1Ω(typ.)
I_D : 4A

Description

The MTN4N60FI 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-262 package is universally preferred for all commercial-industrial applications

Features

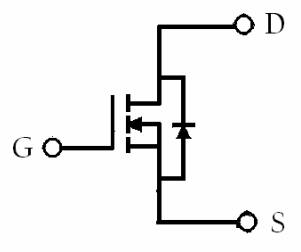
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

Applications

- Open Framed Power Supply
- Adapter
- STB

Symbol

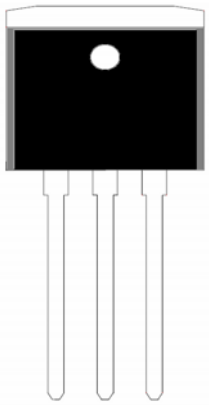
MTN4N60FI



G：Gate
D：Drain
S：Source

Outline

TO-262



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	4*	A
Continuous Drain Current @T_C=100°C	I_D	2.4*	A
Pulsed Drain Current @ V_{GS}=10V (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}	10	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
Maximum Temperature for Soldering @ Package Body for 10 seconds	T_{PKG}	260	°C
Total Power Dissipation (T_C=25℃)	Pd	100	W
Linear Derating Factor		0.8	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}=4A, V_{DD}=50V, L=8mH, V_G=10V, starting TJ=+25℃.

3. I_{SD}≤4A, dI/dt≤100A/μs, V_{DD}≤BV_{DSS}, starting TJ=+25℃.

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1.25	°C/W
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62.5	°C/W

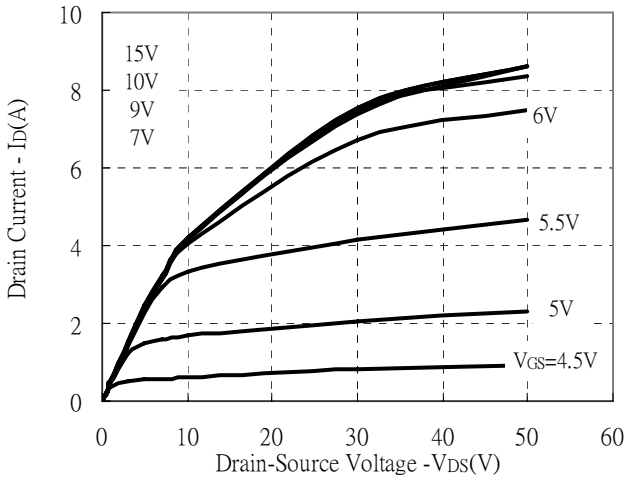
Characteristics (T_C=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	600	-	-	V	V_{GS}=0, I_D=250μA, Tj=25℃
$\Delta BV_{DSS}/\Delta Tj$	-	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}	-	3	-	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, Tj=125°C
*$R_{DS(ON)}$	-	2.1	2.5	Ω	V_{GS} =10V, I_D=2A
Dynamic					
*Qg	-	16	-	nC	I_D=4A, V_{DD}=300V, V_{GS}=10V
*Qgs	-	3.2	-		
*Qgd	-	6.2	-		
*$t_{d(ON)}$	-	9.6	-	ns	V_{DD}=300V, I_D=4A, V_{GS}=10V, R_G=10Ω
*tr	-	12.2	-		
*$t_{d(OFF)}$	-	22.3	-		
*t_f	-	14.8	-		
Ciss	-	700	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	86	-		
Crss	-	20	-		
Source-Drain Diode					
*V_{SD}	-	-	1.5	V	I_S=4A, V_{GS}=0V
*I_S	-	-	4	A	
*I_{SM}	-	-	16		
*trr	-	300	-	ns	V_{GS}=0, I_F=4A, dI/dt=100A/μs
*Qrr	-	2.6	-	μC	

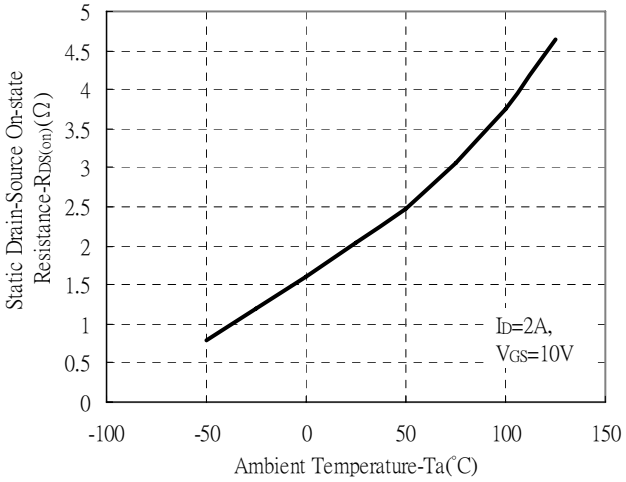
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

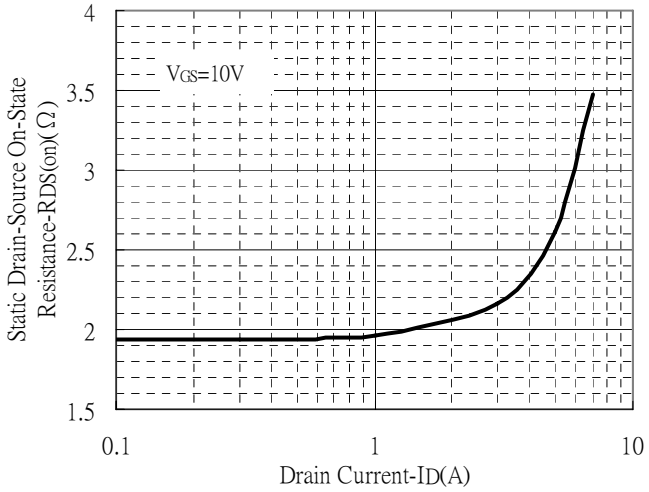
Typical Output Characteristics



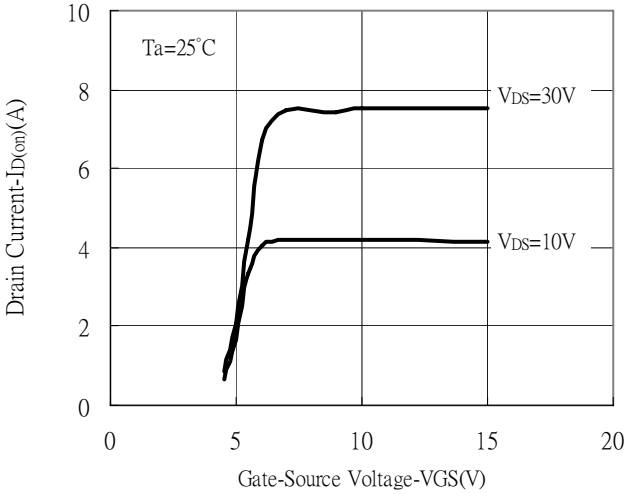
Static Drain-Source On-resistance vs Ambient Temperature



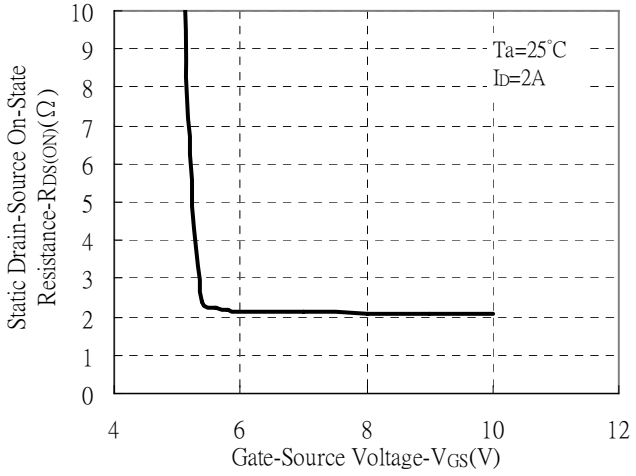
Static Drain-Source On-State resistance vs Drain Current



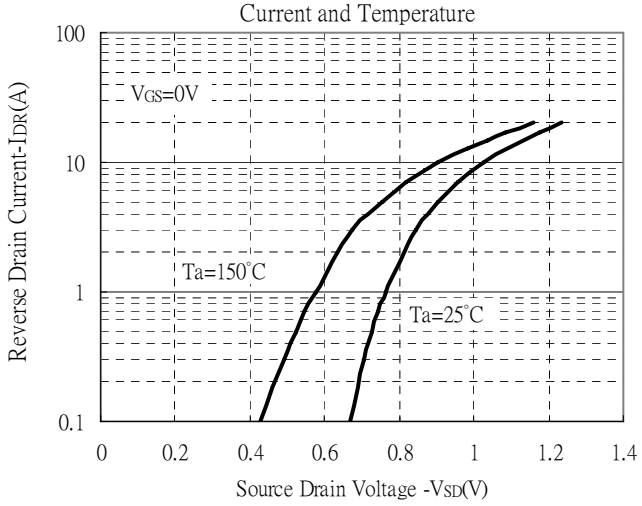
Drain Current vs Gate-Source Voltage



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

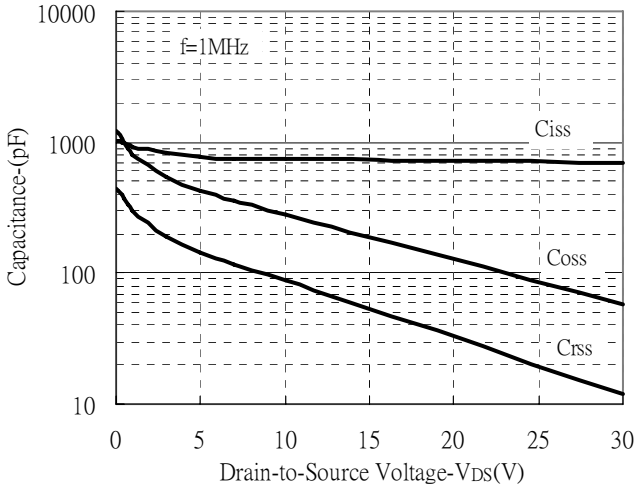


Body Diode Forward Voltage Variation vs Source Current and Temperature

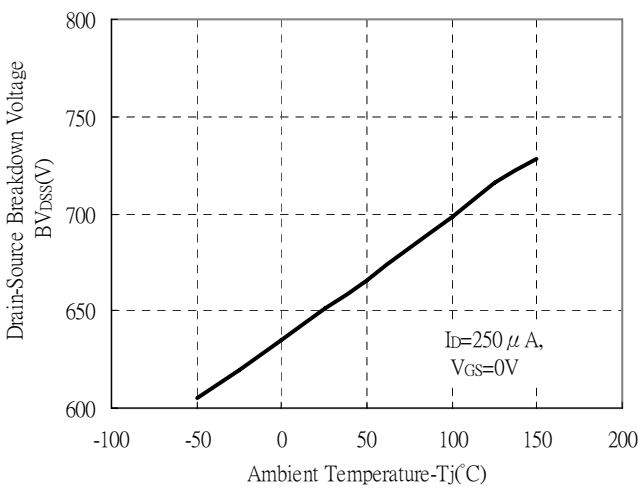


Typical Characteristics(Cont.)

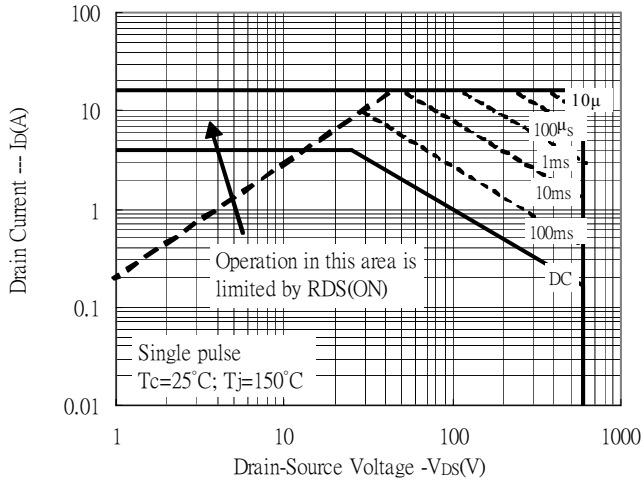
Capacitance vs Reverse Voltage



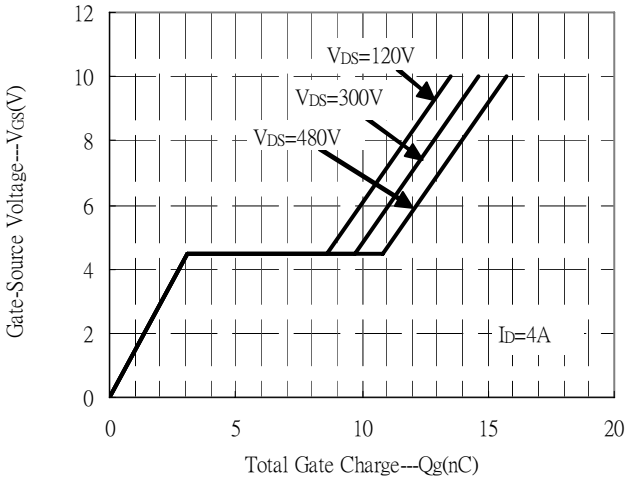
Brekdown Voltage vs Ambient Temperature



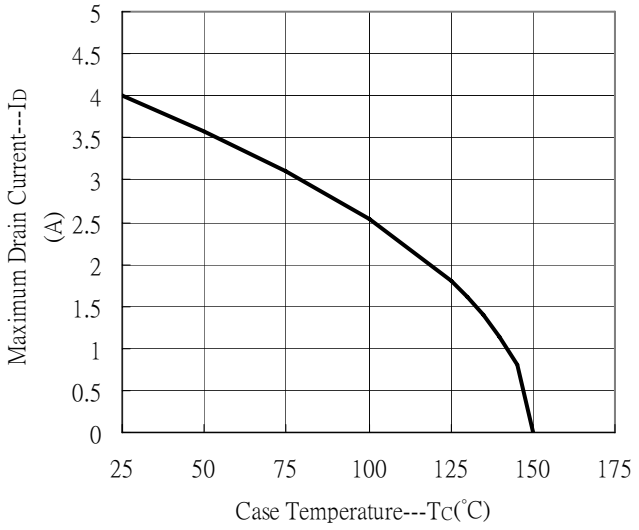
Maximum Safe Operating Area



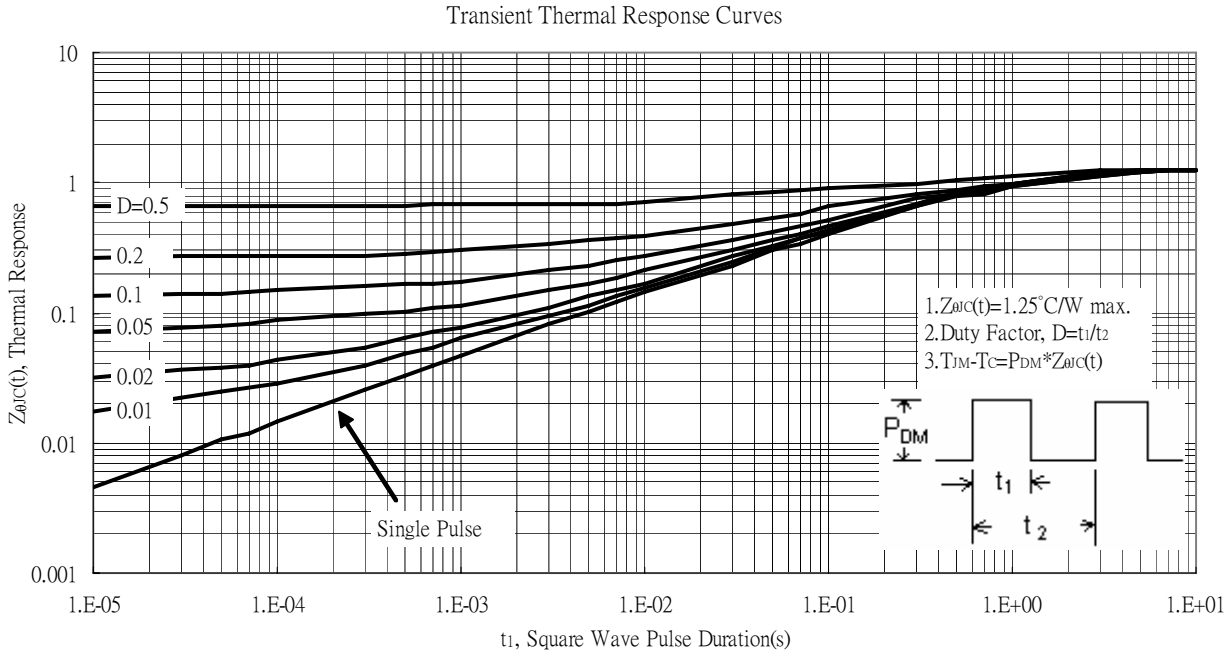
Gate Charge Characteristics



Maximum Drain Current vs Case Temperature

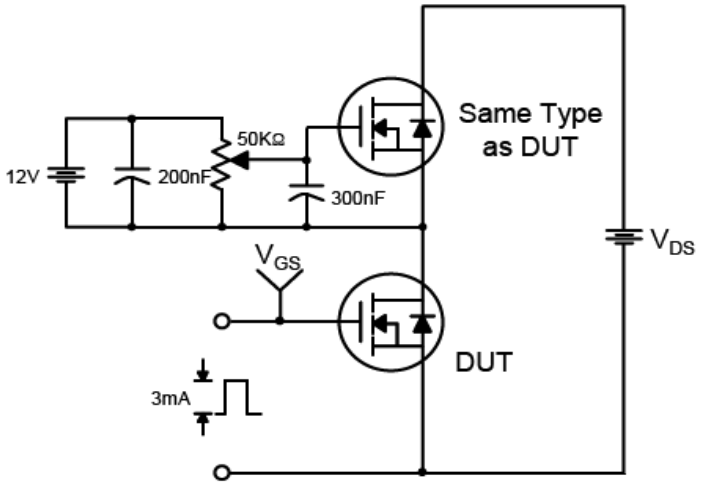


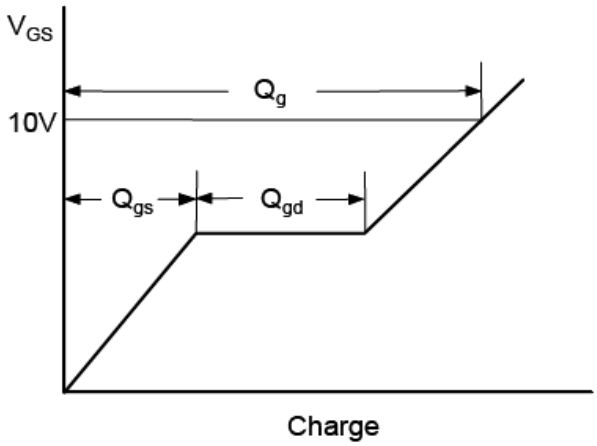
Typical Characteristics(Cont.)



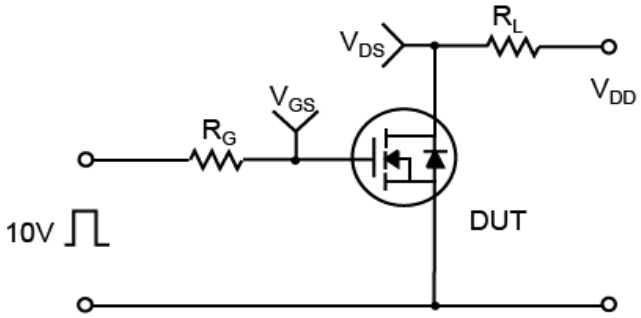
Test Circuits and Waveforms

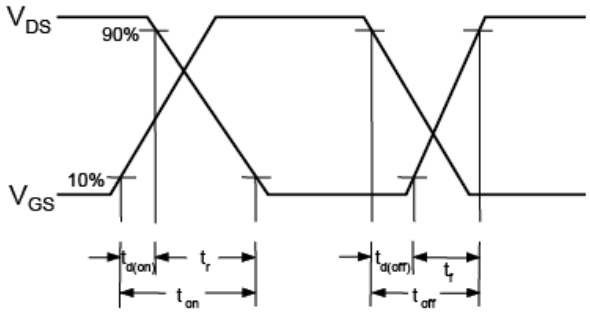
Gate Charge Test Circuit & Waveform



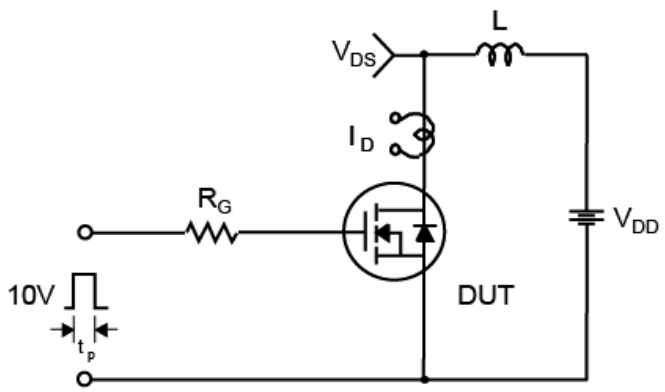


Resistive Switching Test Circuit & Waveforms

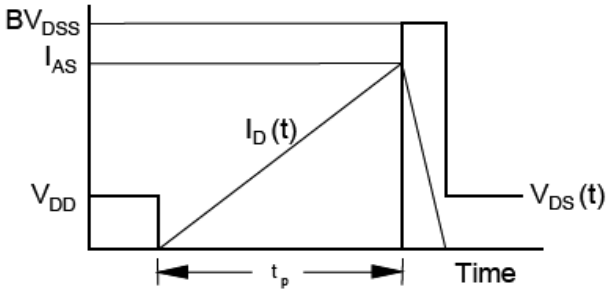




Unclamped Inductive Switching Test Circuit & Waveforms

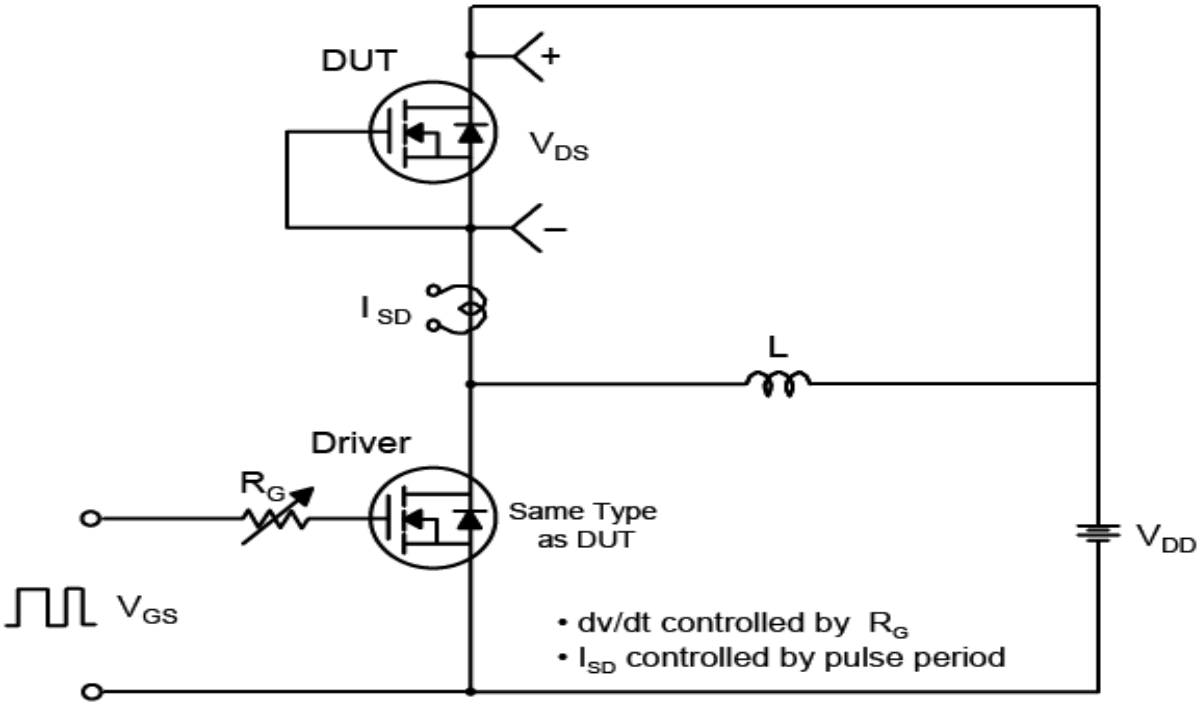


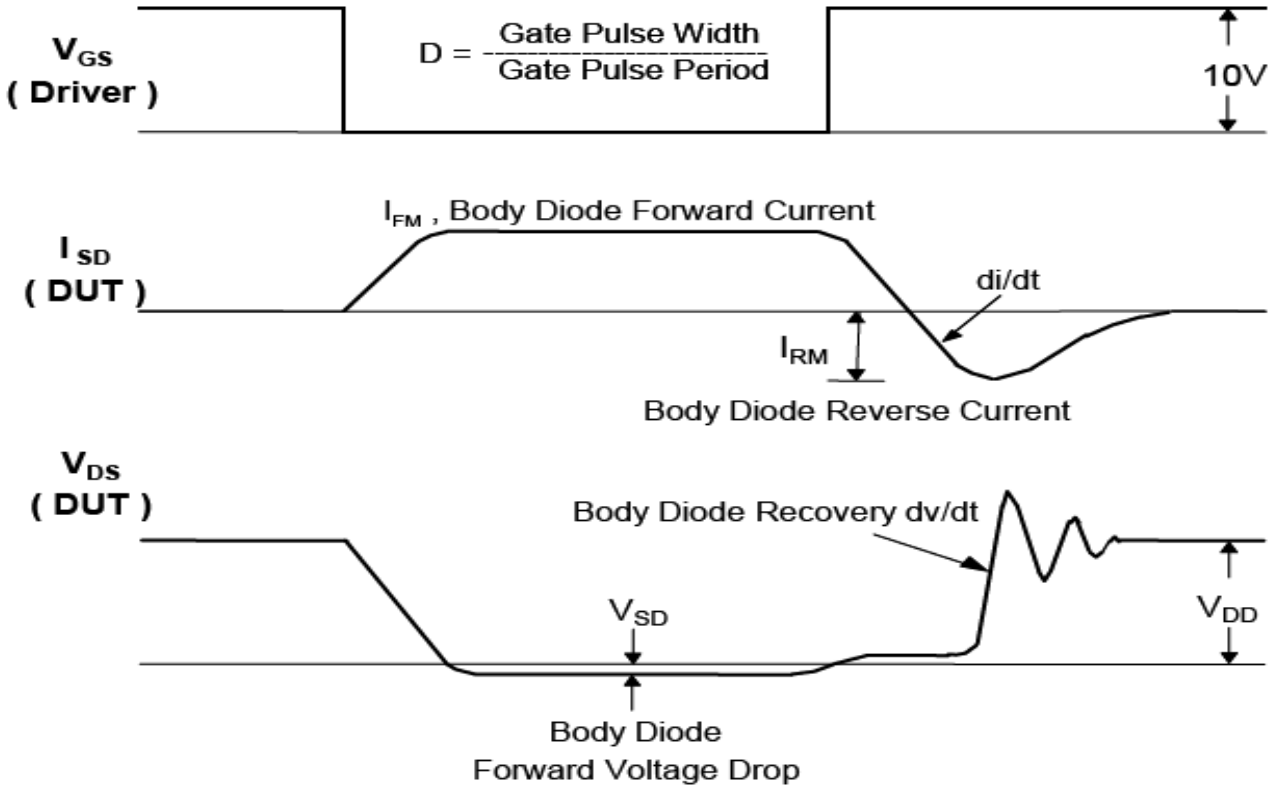
$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



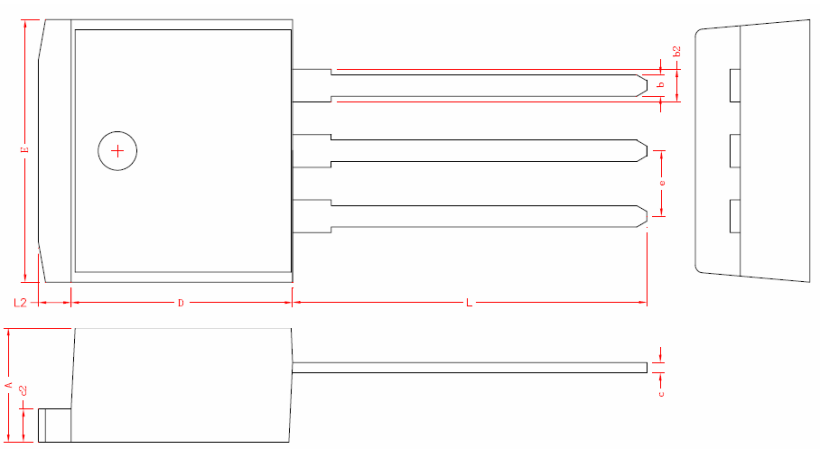
Test Circuits and Waveforms(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms

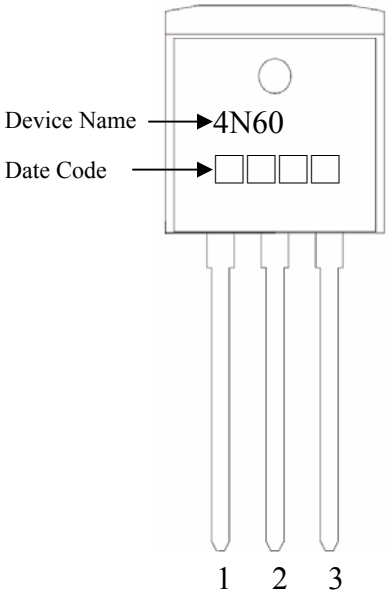




TO-262 Dimension



Marking:



3-Lead TO-262 Plastic Package
CYStek Package Code: FI

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

*Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.40	4.80	0.1732	0.1890	c2	1.25	1.45	0.0492	0.0571
b	0.76	1.00	0.0299	0.0394	b2	1.17	1.47	0.0461	0.0579
D	8.60	9.00	0.3386	0.3543	L	13.25	14.25	0.5217	0.5610
c	0.36	0.50	0.0142	0.0197	e	2.54 REF		0.1000 REF	
E	9.80	10.40	0.3858	0.4094	L2	1.27 REF		0.0500 REF	

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: 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.