

N-Channel Enhancement Mode Power MOSFET

MTN10N40E3

BV_{DSS} : 400V
$R_{DS(ON)}$: 0.47 Ω (typ.)
I_D : 10A

Description

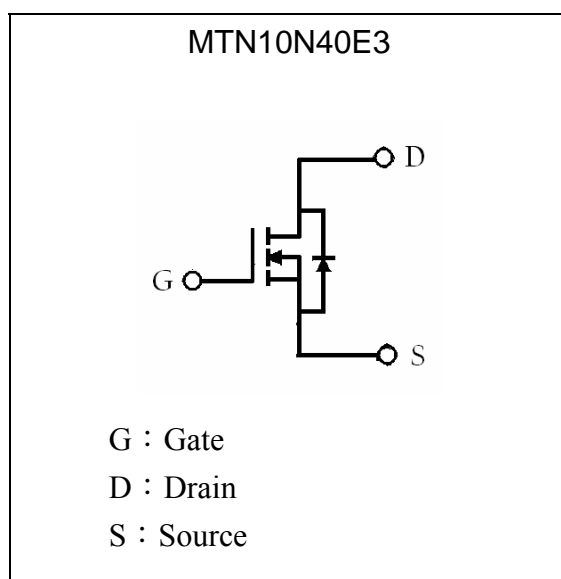
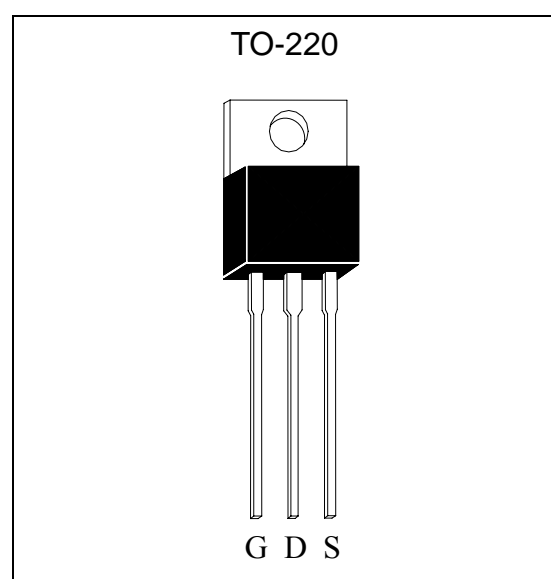
The MTN10N40E3 is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness. The TO-220 package is universally preferred for all commercial-industrial applications

Features

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

Applications

- Switching Mode Power Supply

Symbol**Outline**

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

Parameter	Symbol	Limits	Unit
Drain-Source Voltage (Note 1)	V_{DS}	400	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 (Note 3)	E_{AS}	457	mJ
Avalanche Current (Note 2)	I_{AR}	10	A
Repetitive Avalanche Energy (Note 2)	E_{AR}	12.5	mJ
Peak Diode Recovery dv/dt (Note 4)	dv/dt	4.5	V/ns
Maximum Temperature for Soldering @ Lead at 0.125in(3.175mm) from case for 10 seconds	T_L	300	$^{\circ}\text{C}$
Total Power Dissipation ($T_C=25^{\circ}\text{C}$)	P_D	125	W
Linear Derating Factor above 25°C		1	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. $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$.
 2. Repetitive rating; pulse width limited by maximum junction temperature.
 3. $I_{SD}=10\text{A}$, $dI/dt < 100\text{A}/\mu\text{s}$, $V_{DD} < BV_{DSS}$, $T_J=+150^{\circ}\text{C}$.
 4. $I_{AS}=10\text{A}$, $V_{DD}=50\text{V}$, $L=8\text{mH}$, $R_G=25\Omega$, starting $T_J=+25^{\circ}\text{C}$.

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1	$^{\circ}\text{C}/\text{W}$
Thermal Resistance, Junction-to-ambient, max	$R_{th,j-a}$	62.5	$^{\circ}\text{C}/\text{W}$



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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	400	-	-	V	V _{GS} =0, I _D =250μA
ΔBV _{DSS} /ΔT _j	-	0.4	-	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}	-	7	-	S	V _{DS} =15V, I _D =5A
I _{GSS}	-	-	±100	nA	V _{GS} =±30
I _{DSS}	-	-	1	μA	V _{DS} =400V, V _{GS} =0
	-	-	25		V _{DS} =320V, V _{GS} =0, T _j =125°C
*R _{DS(ON)}	-	0.47	0.55	Ω	V _{GS} =10V, I _D =6A
Dynamic					
*Q _g	-	32	-	nC	I _D =10A, V _{DD} =320V, V _{GS} =10V
*Q _{gs}	-	9	-		
*Q _{gd}	-	12	-		
*t _{d(ON)}	-	14	-	ns	V _{DD} =200V, I _D =10A, V _{GS} =10V, R _G =9.1 Ω
*t _r	-	30	-		
*t _{d(OFF)}	-	31	-		
*t _f	-	26	-		
C _{iss}	-	1400	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
C _{oss}	-	117	-		
C _{rss}	-	25	-		
Source-Drain Diode					
*I _S	-	-	10	A	
*I _{SM}	-	-	40		
*V _{SD}	-	-	1.5	V	I _S =10A, V _{GS} =0V
*t _{rr}	-	360	-	ns	V _{GS} =0, I _F =10A, dI/dt=100A/μs
*Q _{rr}	-	3.2	-	μC	

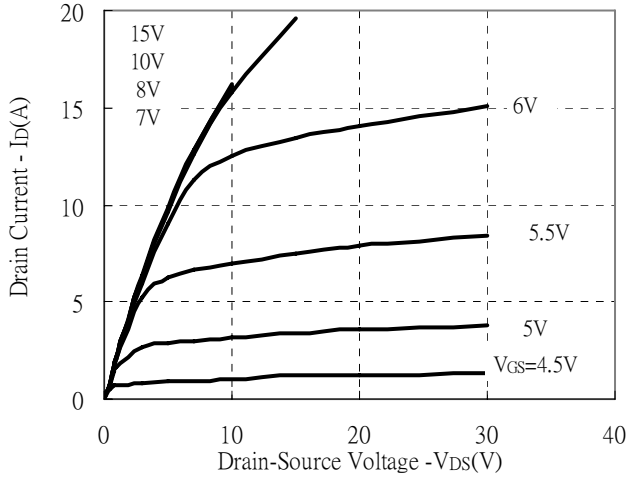
*Pulse Test : Pulse Width ≤300μs, Duty Cycle ≤2%

Ordering Information

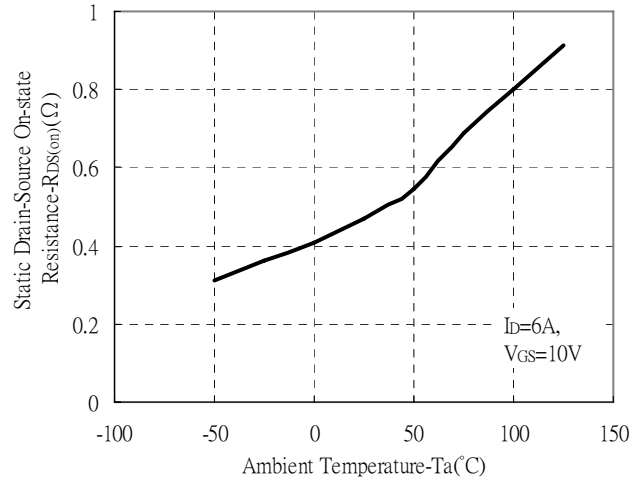
Device	Package	Shipping	Marking
MTN10N40E3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton	10N40

Typical Characteristics

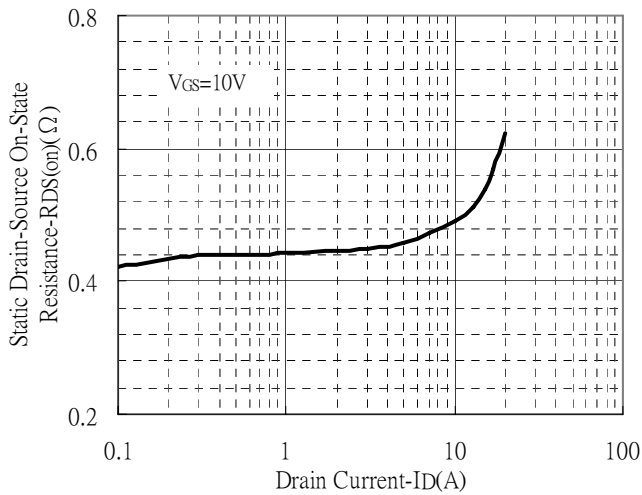
Typical Output Characteristics



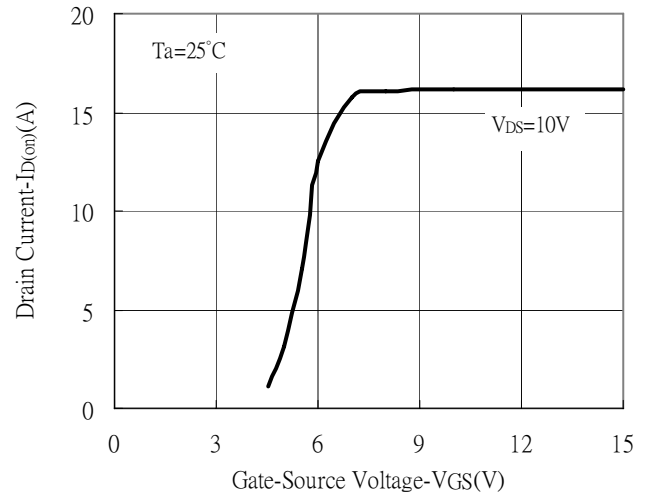
Static Drain-Source On-resistance vs Ambient Temperature



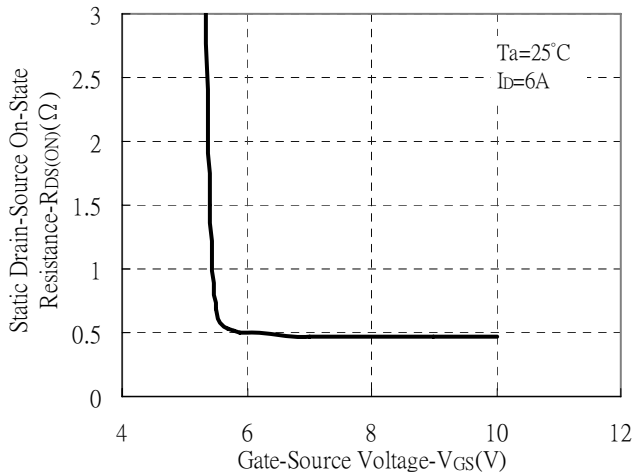
Static Drain-Source On-State resistance vs Drain Current



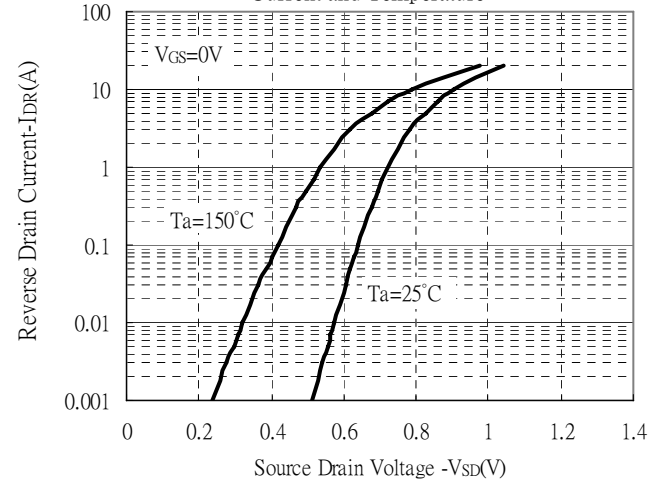
Drain Current vs Gate-Source Voltage



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



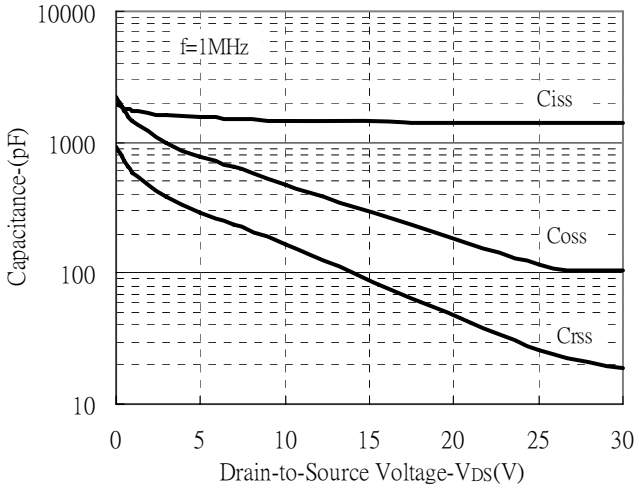
Body Diode Forward Voltage Variation vs Source Current and Temperature



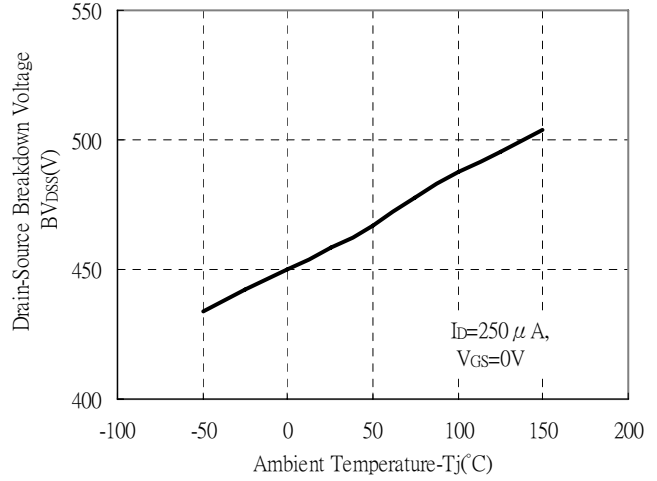


Typical Characteristics(Cont.)

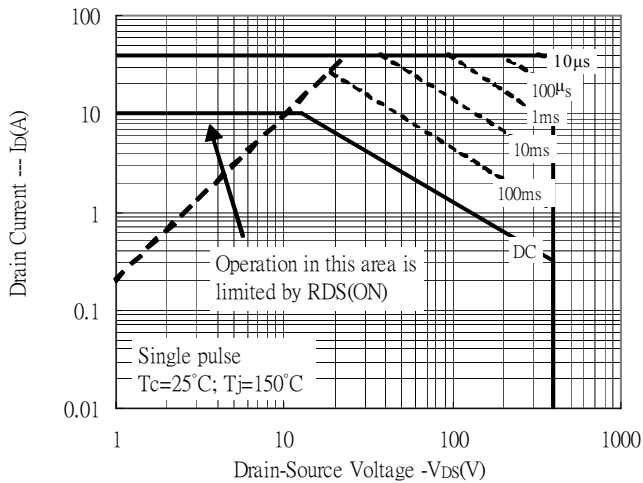
Capacitance vs Reverse Voltage



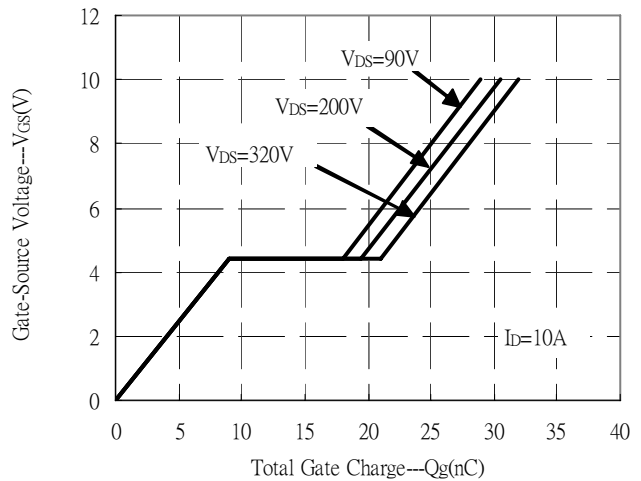
Breakdown Voltage vs Ambient Temperature



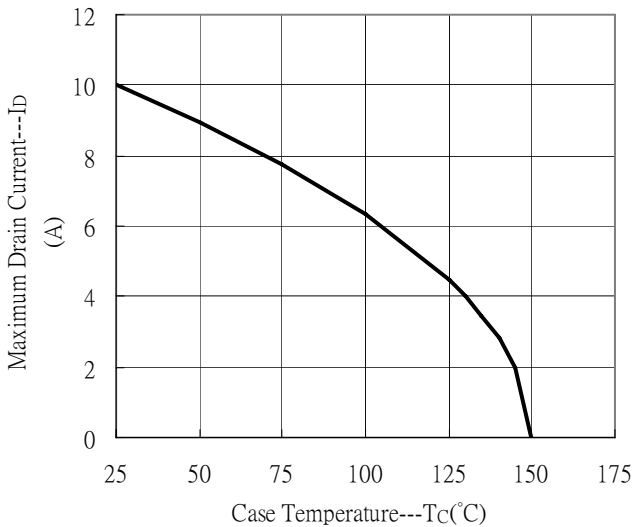
Maximum Safe Operating Area



Gate Charge Characteristics

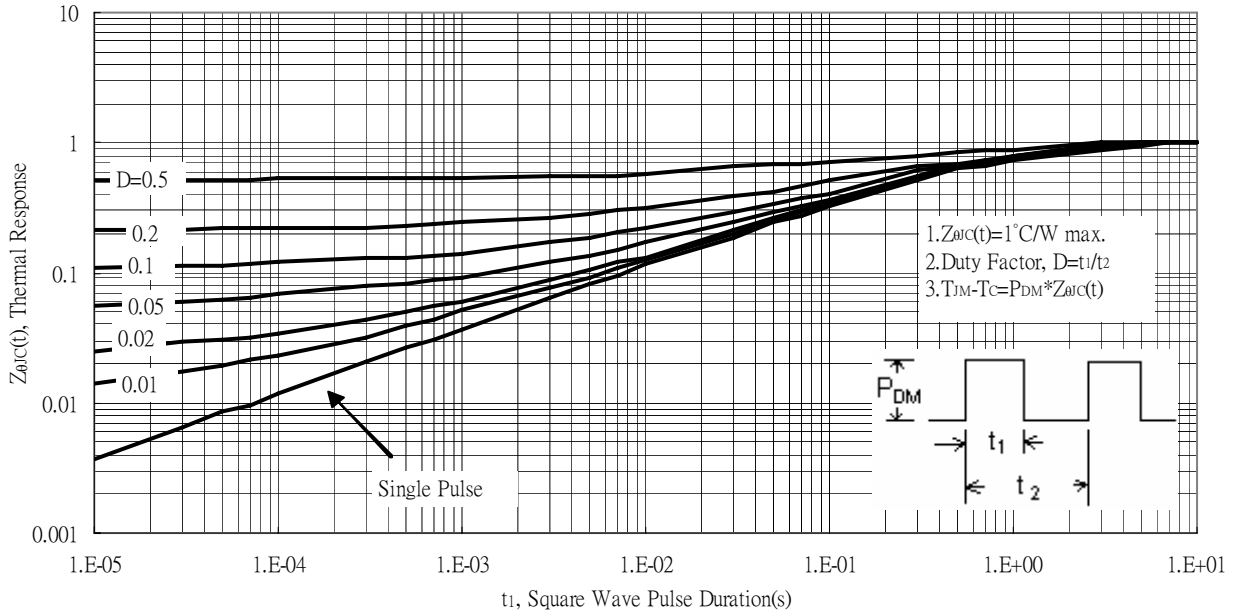


Maximum Drain Current vs Case Temperature

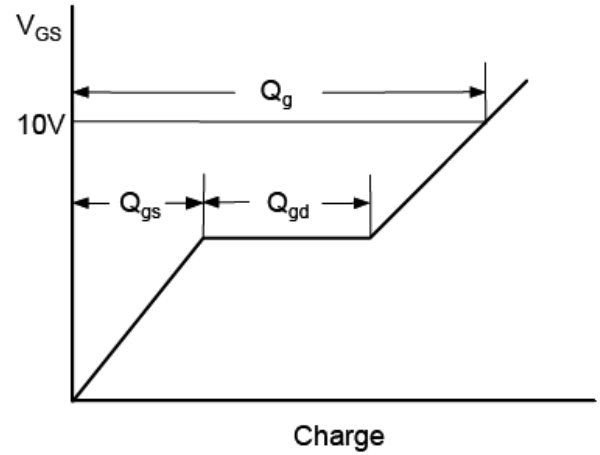
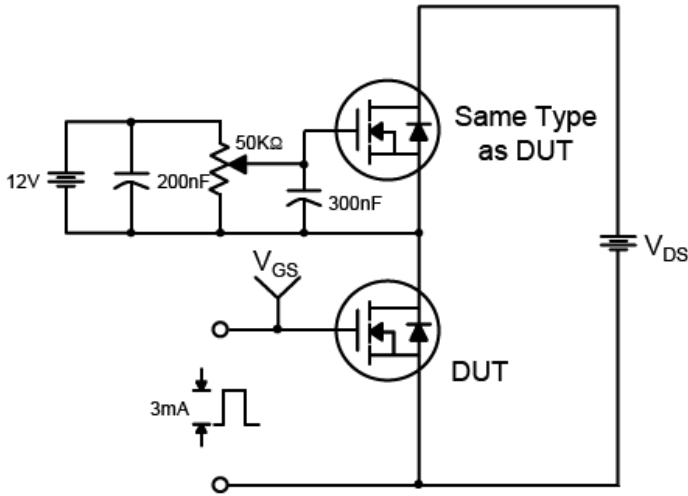


Typical Characteristics(Cont.)

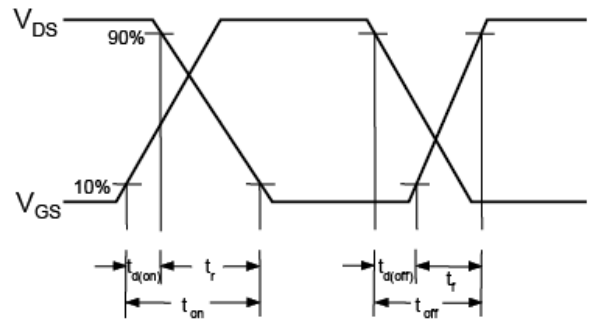
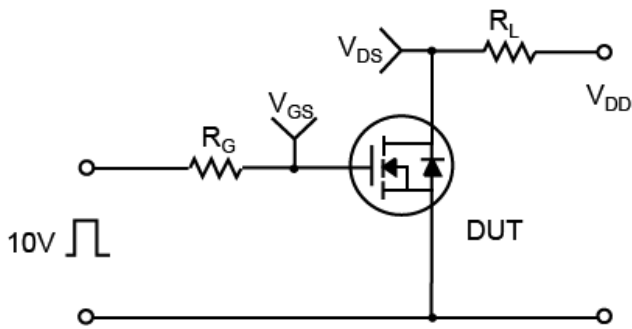
Transient Thermal Response Curves



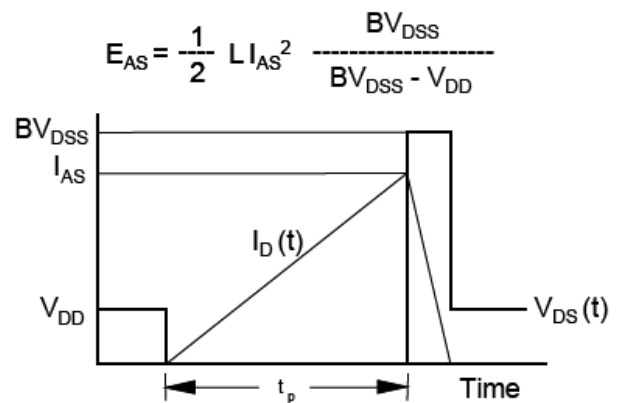
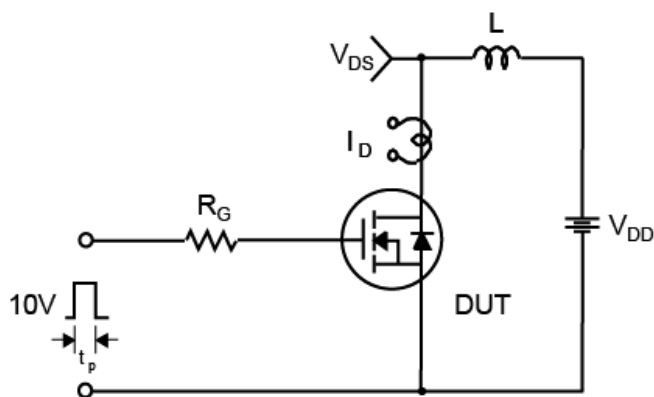
Test Circuit and Waveforms



Resistive Switching Test Circuit & Waveforms

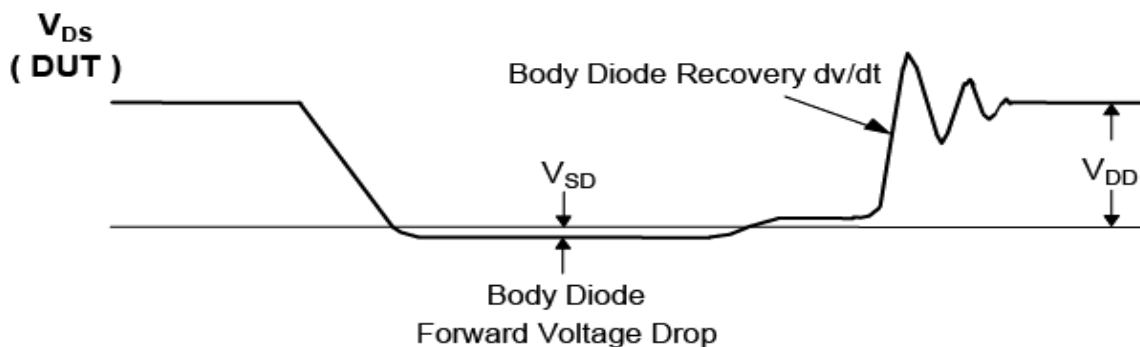
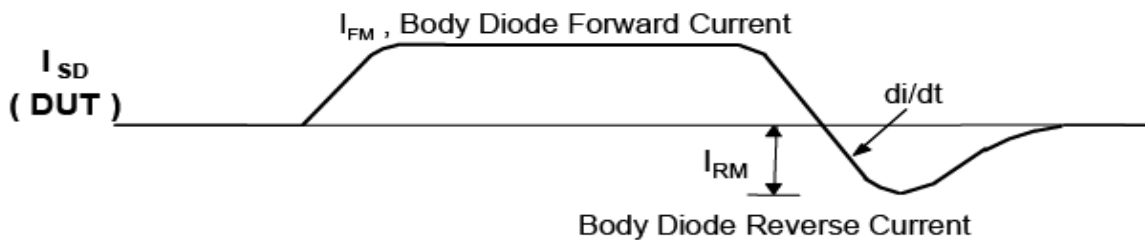
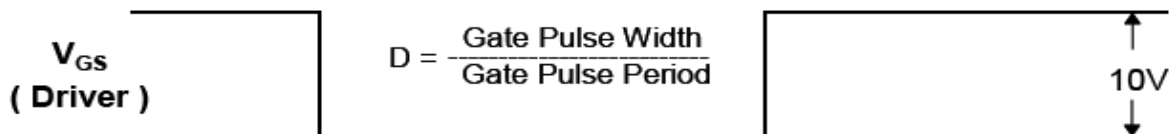
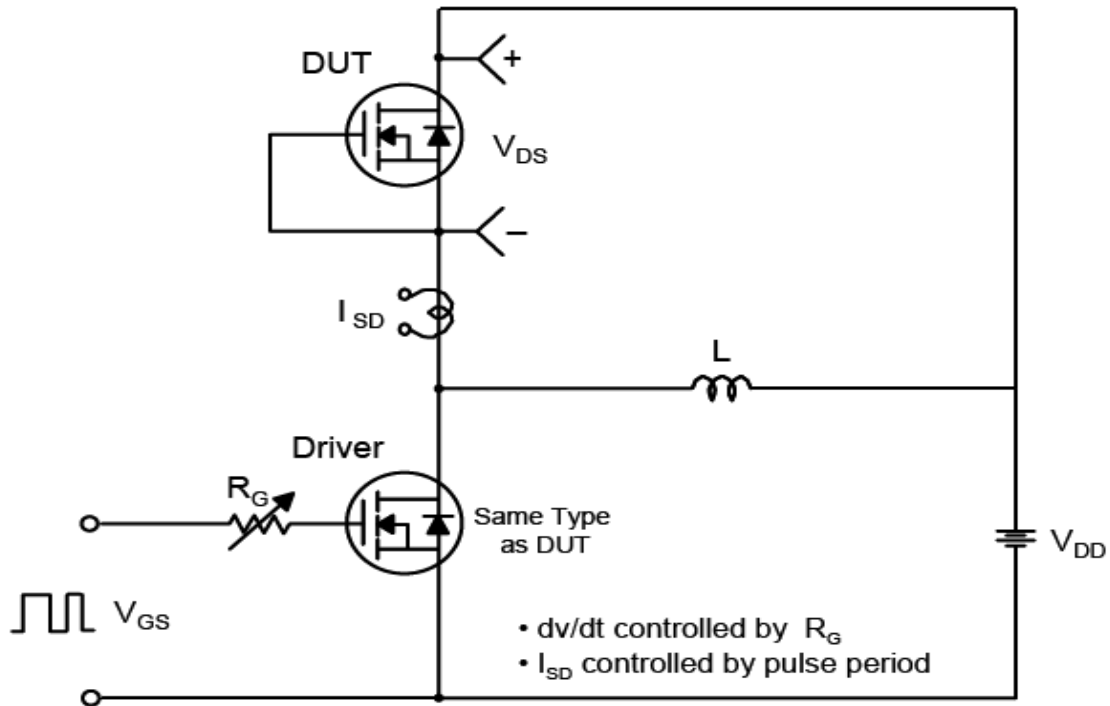


Unclamped Inductive Switching Test Circuit & Waveforms

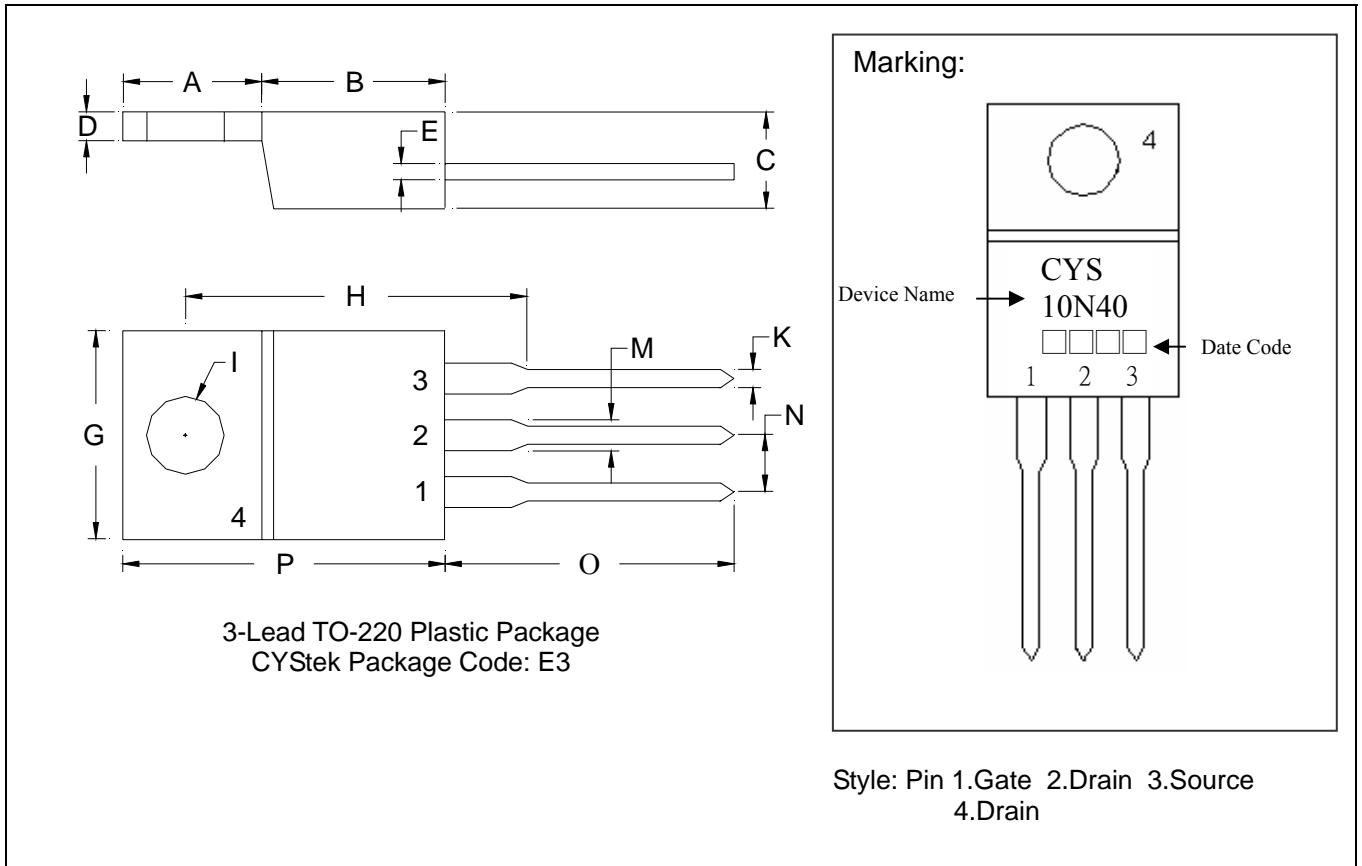


Test Circuit and Waveforms(Cont.)

Peak Diode Recovery dv/dt Test Circuit & Waveforms



TO-220 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.