

## N-Channel Enhancement Mode Power MOSFET

# MTN3205E3

$BV_{DSS}$	55V
$R_{DSON(Max)}$	8 m $\Omega$
$I_D$	110A

### Description

The MTN3205E3 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

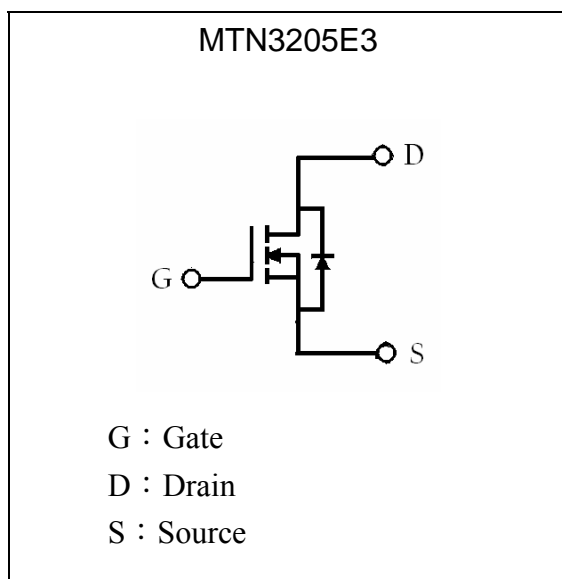
### Features

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

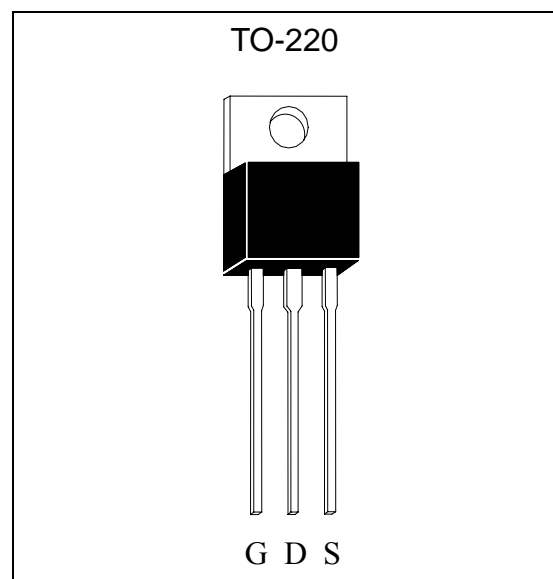
### Applications

- E-bike
- UPS

### Symbol



### Outline



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

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	$V_{DS}$	55	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current	$I_D$	110	A
Continuous Drain Current @ $T_c=100^{\circ}\text{C}$	$I_D$	66	A
Pulsed Drain Current @ $V_{GS}=10\text{V}$ (Note 1)	$I_{DM}$	440	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	550	mJ
Repetitive Avalanche Energy (Note 1)	$E_{AR}$	15	
Total Power Dissipation ( $T_c=25^{\circ}\text{C}$ )	$P_D$	150	W
Linear Derating Factor		1.0	W/ $^{\circ}\text{C}$
Operating Junction and Storage Temperature	$T_j, T_{stg}$	-55~+175	$^{\circ}\text{C}$

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

2.  $I_{AS}=100\text{A}$ ,  $V_{DD}=30\text{V}$ ,  $L=0.05\text{mH}$ ,  $R_G=25\Omega$ , starting  $T_j=+25^{\circ}\text{C}$

**Thermal Data**

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{th,j-c}$	1.0	$^{\circ}\text{C}/\text{W}$
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
<b>Static</b>					
BV <sub>DSS</sub>	55	-	-	V	V <sub>GS</sub> =0, I <sub>D</sub> =250μA
V <sub>GS(th)</sub>	2.0	-	4.0	V	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA
I <sub>GSS</sub>	-	-	±100	nA	V <sub>GS</sub> =±20
I <sub>DSS</sub>	-	-	25	μA	V <sub>DS</sub> =55V, V <sub>GS</sub> =0
	-	-	250	μA	V <sub>DS</sub> =55V, V <sub>GS</sub> =0, T <sub>j</sub> =125°C
R <sub>DS(ON)</sub>	-	-	8	mΩ	V <sub>GS</sub> =10V, I <sub>D</sub> =66A (Note 1)
G <sub>FS</sub>	-	50	-	S	V <sub>DS</sub> =10V, I <sub>D</sub> =55A (Note 1)
<b>Dynamic</b>					
Q <sub>g</sub>	-	25.7	-	nC	V <sub>DS</sub> =27.5V, I <sub>D</sub> =66A, V <sub>GS</sub> =10V (Note 1 & 2)
Q <sub>gs</sub>	-	5.8	-		
Q <sub>gd</sub>	-	7.5	-		
t <sub>d(ON)</sub>	-	10.2	-	ns	V <sub>DS</sub> =27.5V, I <sub>D</sub> =66A, V <sub>GS</sub> =10V, R <sub>GS</sub> =4.7Ω, R <sub>D</sub> =0.42Ω (Note 1 & 2)
t <sub>r</sub>	-	35.2	-		
t <sub>d(OFF)</sub>	-	33.8	-		
t <sub>f</sub>	-	6.7	-		
C <sub>iss</sub>	-	1413	-	pF	V <sub>GS</sub> =0V, V <sub>DS</sub> =27.5V, f=1MHz
C <sub>oss</sub>	-	320	-		
C <sub>rss</sub>	-	23	-		
<b>Source-Drain Diode</b>					
I <sub>S</sub>	-	-	110	A	(Note 3)
I <sub>SM</sub>	-	-	440		
V <sub>SD</sub>	-	-	1.5	V	I <sub>S</sub> =55A, V <sub>GS</sub> =0V (Note 1)
t <sub>rr</sub>	-	70	-	ns	V <sub>GS</sub> =0, I <sub>F</sub> =66A, dI <sub>F</sub> /dt=100A/μs
Q <sub>rr</sub>	-	120	-	μC	

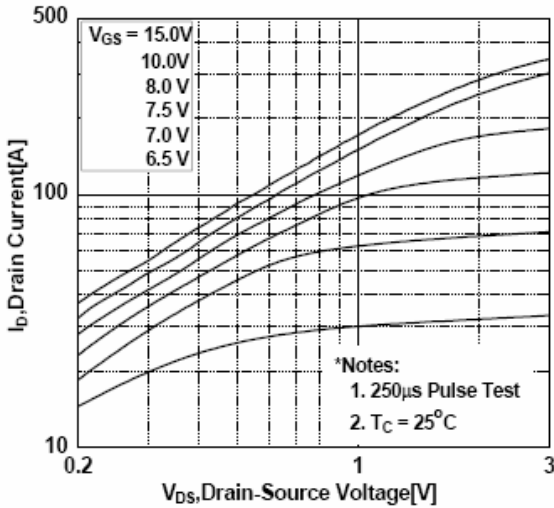
Note : 1. Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%  
 2. Independent of operating temperature  
 3. Pulse width limited by maximum junction temperature.

**Ordering Information**

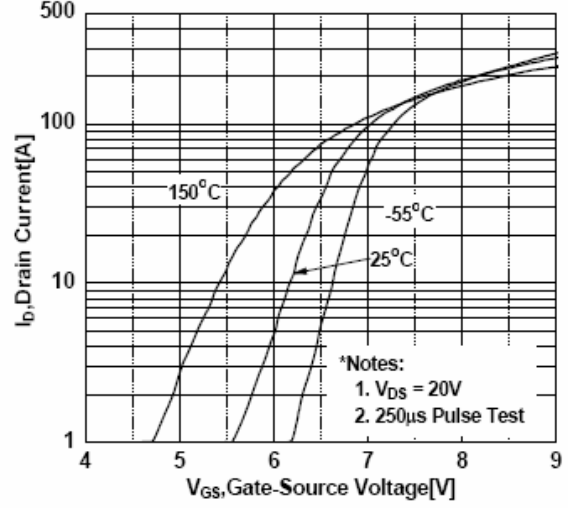
Device	Package	Shipping	Marking
MTN3205E3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton	N3205

**Characteristic Curves**

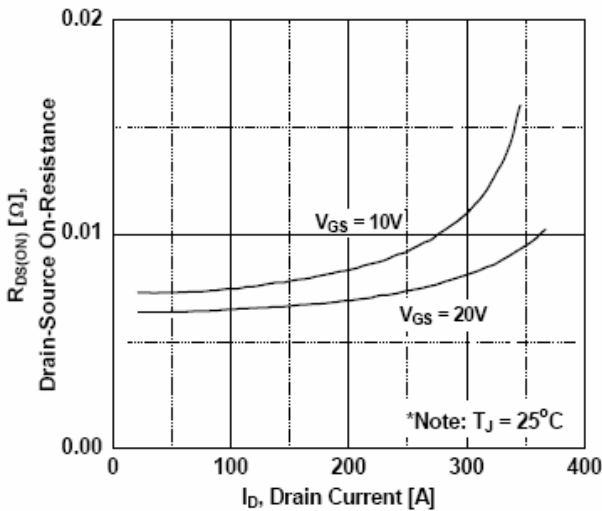
**Figure 1. On-Region Characteristics**



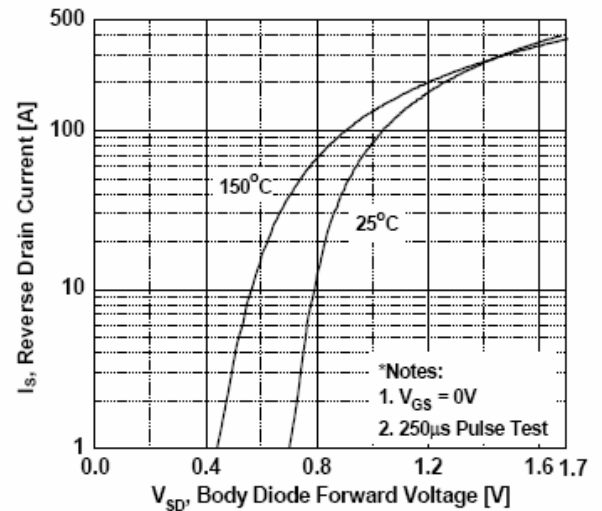
**Figure 2. Transfer Characteristics**



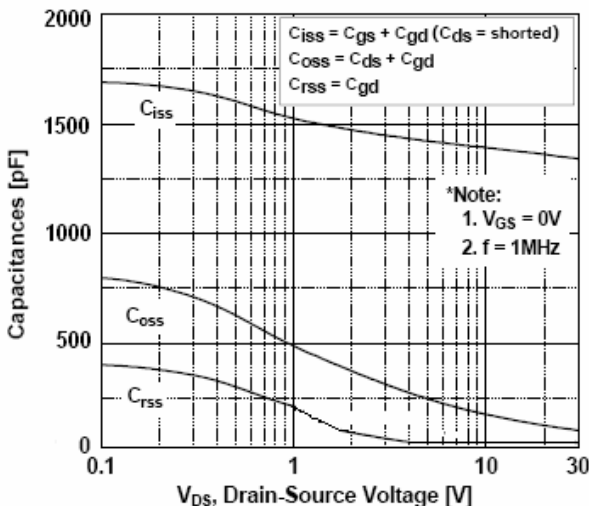
**Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage**



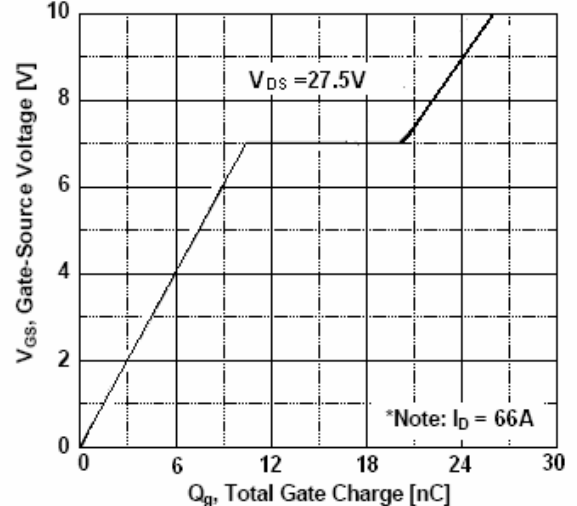
**Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature**



**Figure 5. Capacitance Characteristics**

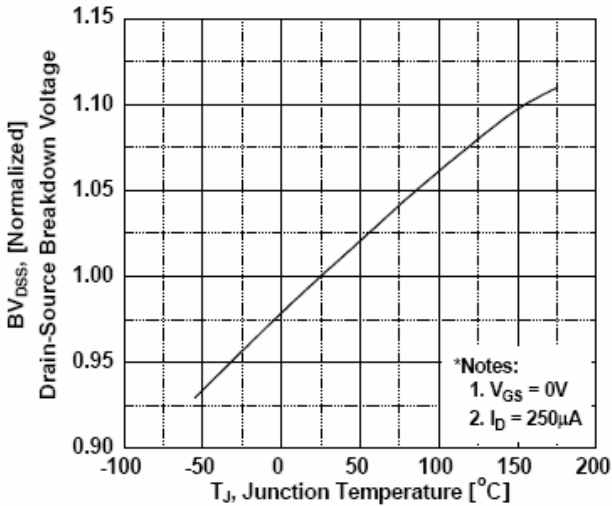


**Figure 6. Gate Charge Characteristics**

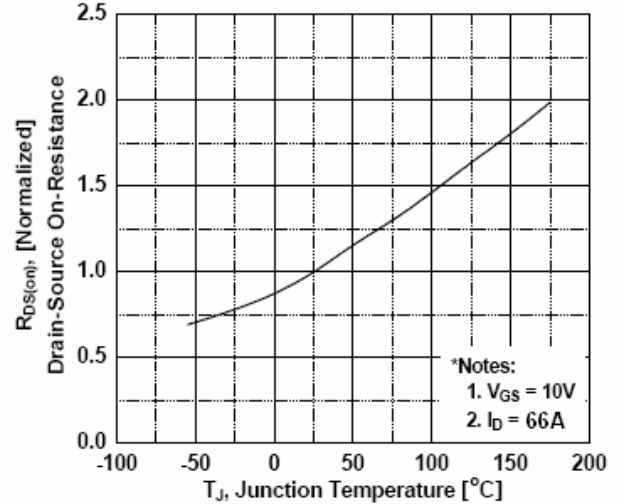


**Characteristic Curves(Cont.)**

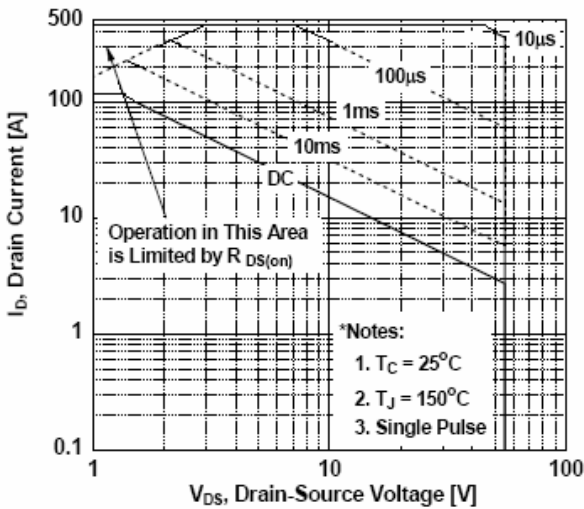
**Figure 7. Breakdown Voltage Variation vs. Temperature**



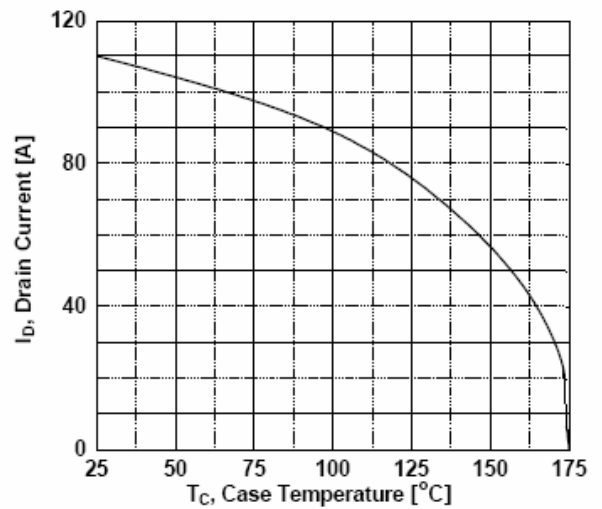
**Figure 8. On-Resistance Variation vs. Temperature**



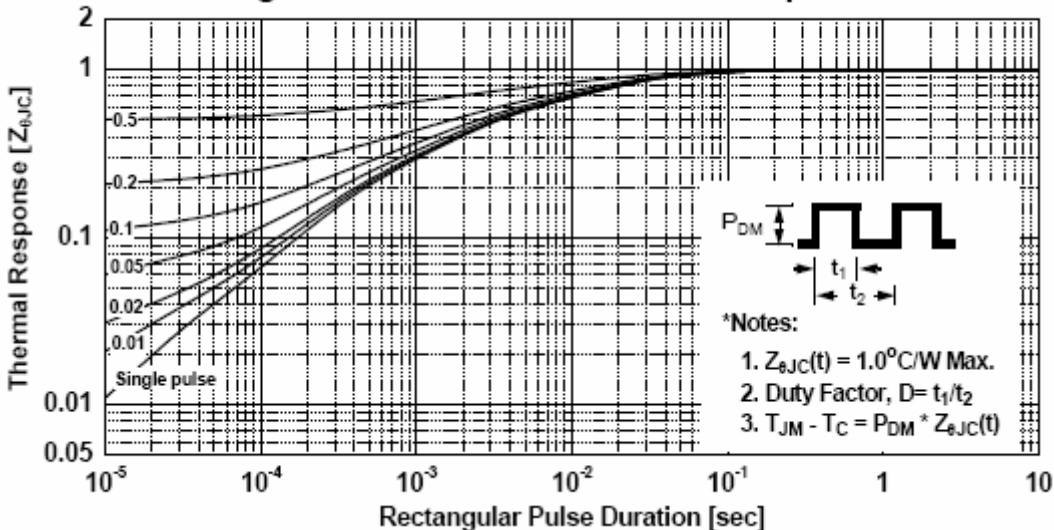
**Figure 9. Maximum Safe Operating Area**



**Figure 10. Maximum Drain Current vs. Case Temperature**

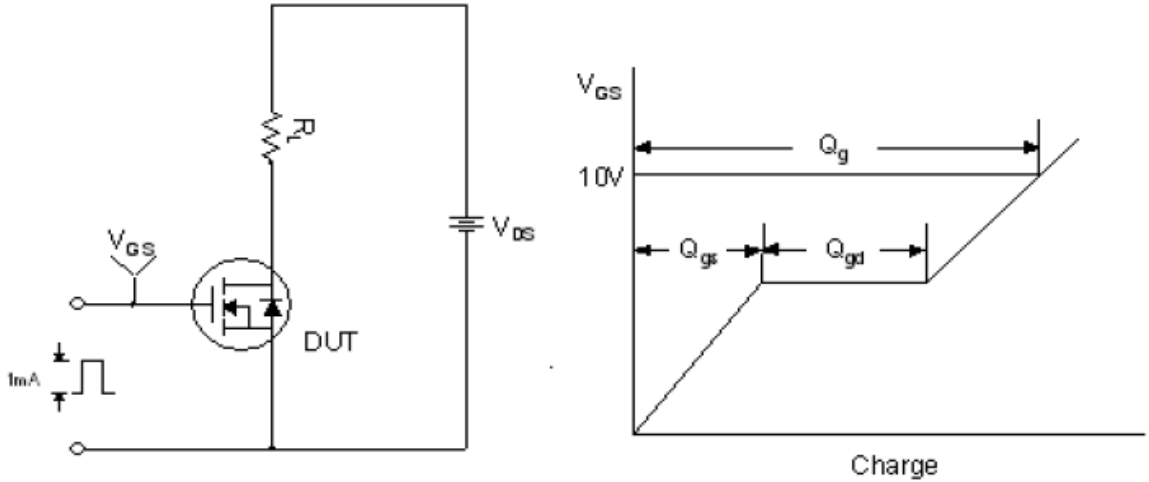


**Figure 11. Transient Thermal Response Curve**

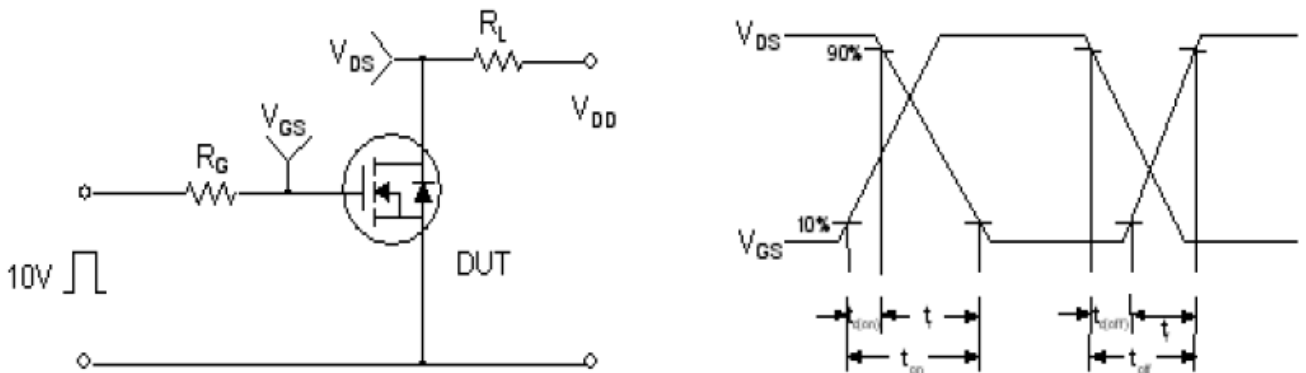


**Test Circuit and Waveforms**

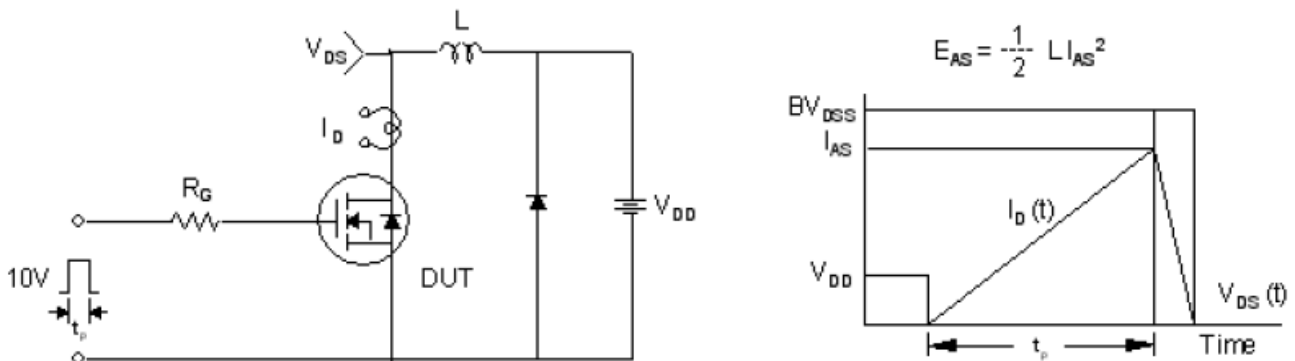
**Gate Charge Test Circuit & Waveform**



**Resistive Switching Test Circuit & Waveforms**

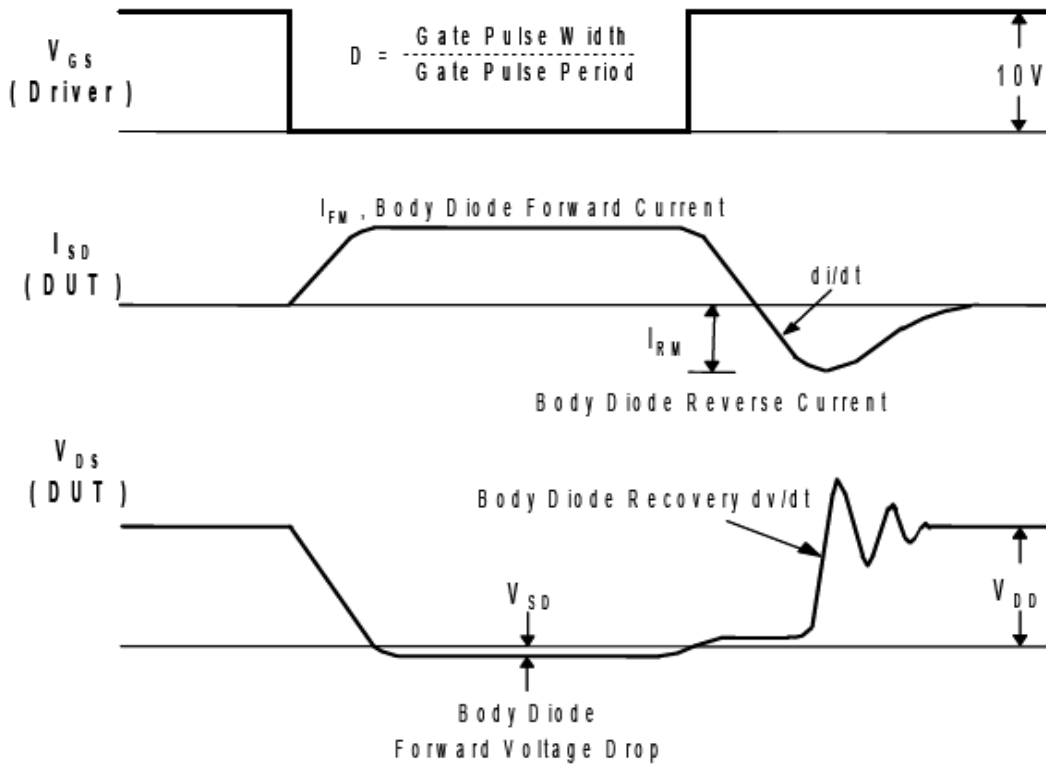
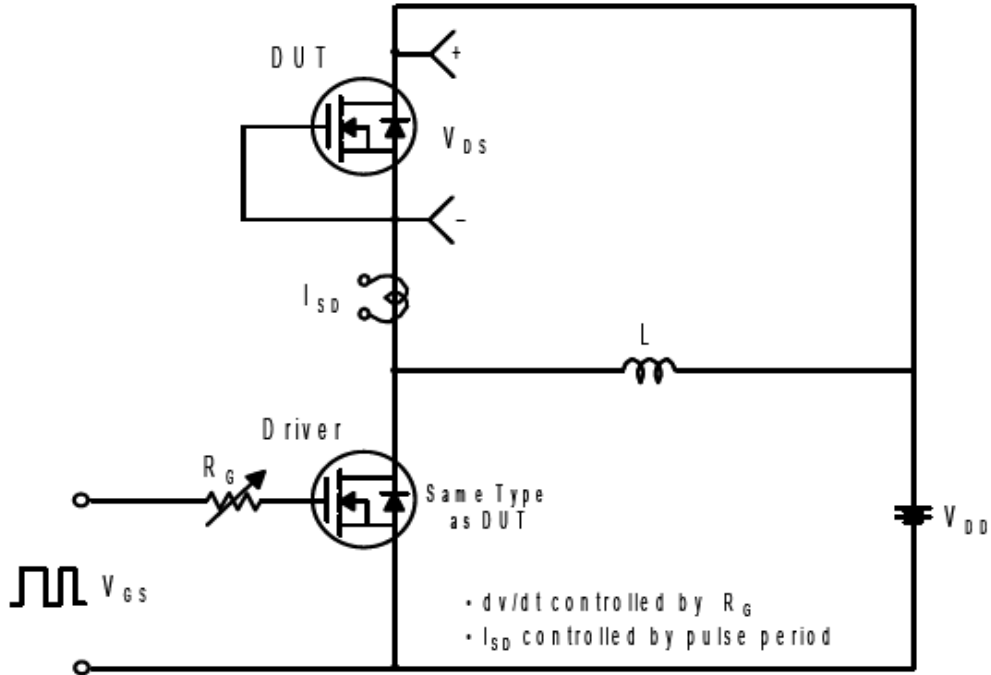


**Unclamped Inductive Switching Test Circuit & Waveforms**

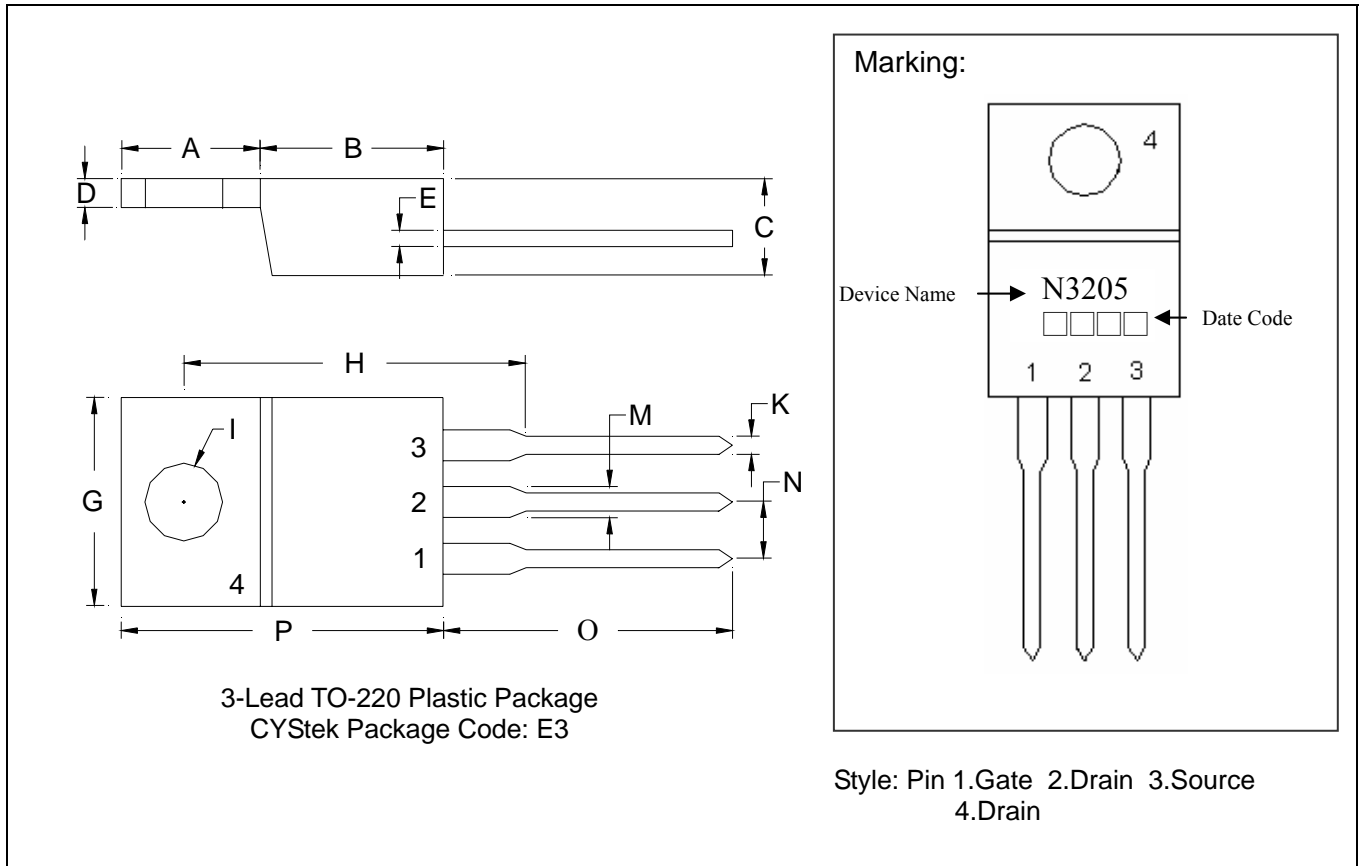


**Test Circuit and Waveforms(Cont.)**

**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

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