

- ★ 100% EAS Guaranteed
- ★ Green Device Available
- ★ Super Low Gate Charge
- ★ Excellent CdV/dt effect decline
- ★ Advanced high cell density Trench technology

Product Summary



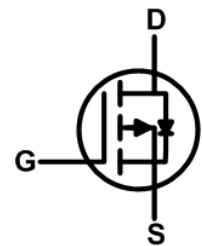
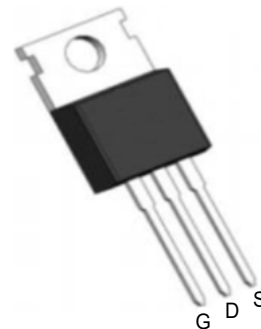
BVDSS	RDSON	ID
-100V	31mΩ	-40A

Description

The UD40P10T is the high cell density trenched P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The UD40P10T meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

TO220 Pin Configuration



Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	-100	V
Continuous drain current $T_C = 25^\circ\text{C}$ (Silicon limit) $T_C =$ 25°C (Package limit) $T_C =$ 100°C (Silicon limit)	I_D	-40 -120 -25	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	-152	A
Avalanche energy, single pulse ($L=0.5\text{mH}$, $R_g=25\Omega$)	E_{AS}	110	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	111	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$
Soldering temperature, wave soldering only allowed at leads (1.6mm from case for 10s)	T_{sold}	260	$^\circ\text{C}$

Thermal Resistance

Parameter	Symbol	Max	Unit
Thermal resistance, junction – case.	R_{thJC}	1.13	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}^*	84	

Electrical Characteristic (at $T_j = 25^\circ\text{C}$, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Static Characteristic						
Drain-source breakdown voltage	BV _{DSS}	-100	-	-	V	V _{GS} =0V, I _D =-250uA
Gate threshold voltage	V _{GS(th)}	-1.5	-2.0	-2.5	V	V _{DS} =V _{GS} ,I _D =-250uA
Zero gate voltage drain current	I _{DSS}	-	-0.05	-1	μA	V _{DS} =-100V,V _{GS} =0V T _j =25°C
		-	-5	-20		T _j =150°C
Gate-source leakage current	I _{GSS}	-	-10	±100	nA	V _{GS} =±20V,V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	-	31	37	mΩ	V _{GS} =-10V, I _D =-22A T _j =25°C
		-	61	73		T _j =150°C
		-	37	48		VGS=-4.5V, I _D =-10A
Transconductance	g _{fs}	-	60	-	S	V _{DS} =-5V,I _D =-22A

Dynamic Characteristic

Input Capacitance	C_{iss}	-	5612	-	pF	$V_{GS}=0V, V_{DS}=-50V,$ $f=1\text{MHz}$
Output Capacitance	C_{oss}	-	180	-		
Reverse Transfer Capacitance	C_{rss}	-	80	-		
Gate Total Charge	Q_G	-	102	-	nC	$V_{GS}=-10V, V_{DS}=-50V,$ $I_D=-22A, f=1\text{MHz}$
Gate-Source charge	Q_{gs}	-	25	-		
Gate-Drain charge	Q_{gd}	-	19	-		
Turn-on delay time	$t_{d(on)}$	-	15	-	ns	$V_{GS}=-10V, V_{DD}=-50V,$ $R_{G_ext}=2.7\Omega, I_D=-22A$
Rise time	t_r	-	38	-		
Turn-off delay time	$t_{d(off)}$	-	86	-		
Fall time	t_f	-	68	-		
Gate resistance	R_G	-	4.3	- Ω		$V_{GS}=0V, V_{DS}=0V,$ $f=1\text{MHz}$



Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-0.9	-1.3	V	$V_{GS}=0V, I_{SD}=-22A$
Body Diode Forward Current	I_S			-40	A	$T_C = 25^{\circ}C$
Body Diode Reverse Recovery Time	t_{rr}	-	36	-	ns	$I_{SD}=-22A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	62	-	nC	

*The value of R_{thJA} is measured by placing the device in a still air box which is one cubic foot.

Typical Performance Characteristics

Fig 1: Output Characteristics

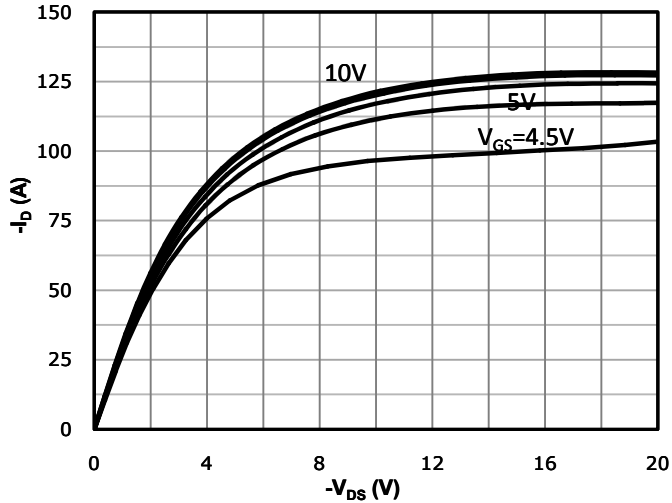


Fig 2: Transfer Characteristics

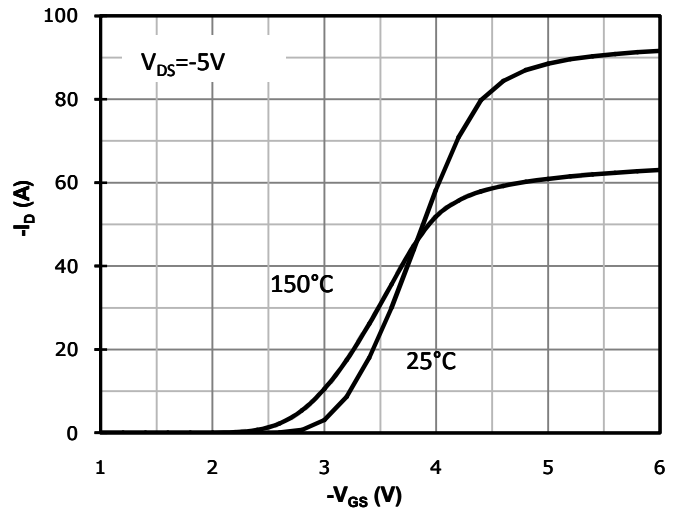


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

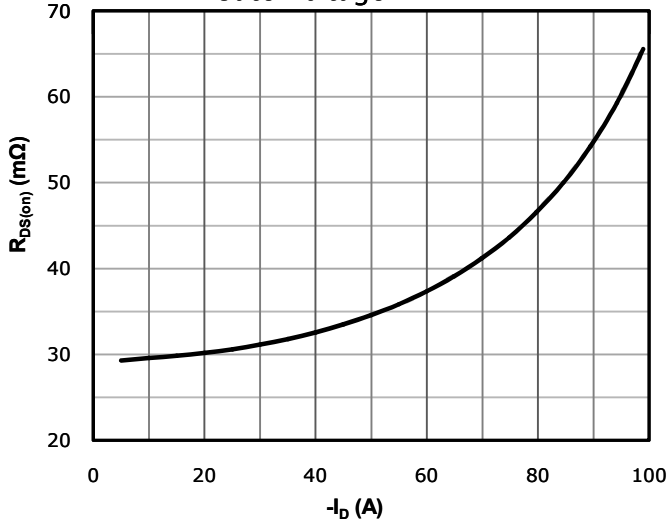


Fig 4: $R_{DS(on)}$ vs Gate Voltage

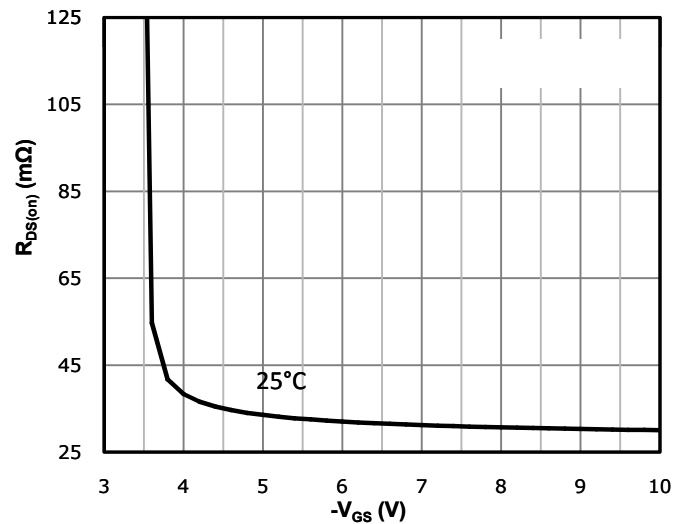


Fig 5: $R_{DS(on)}$ vs. Temperature

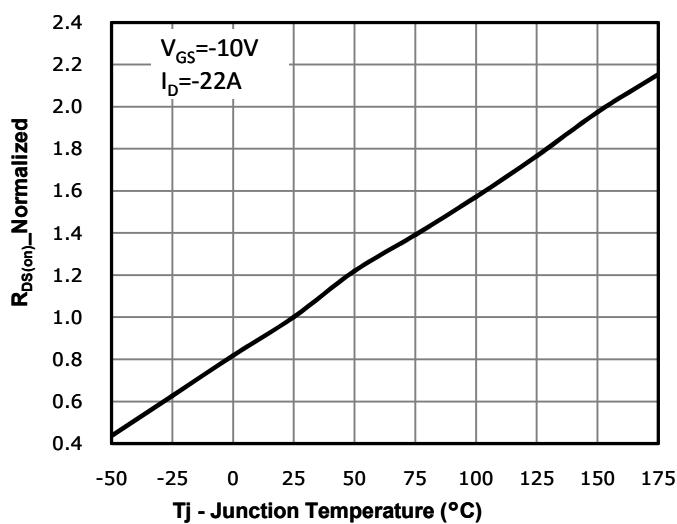


Fig 6: Capacitance Characteristics

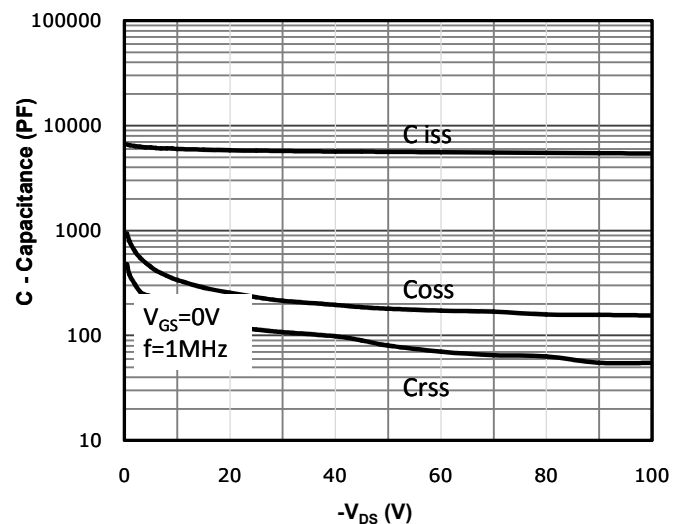




Fig 7: Gate Charge Characteristics

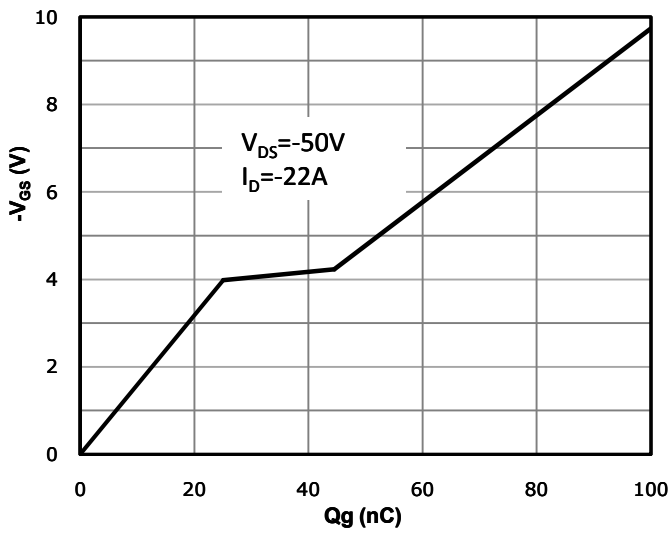


Fig 8: Body-diode Forward Characteristics

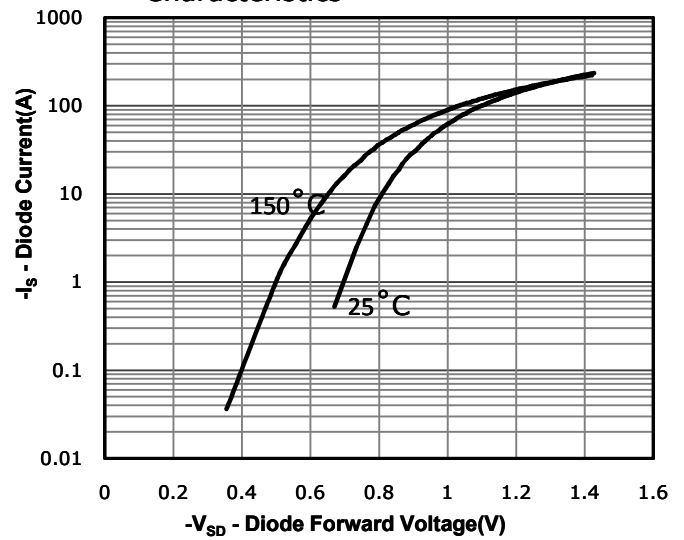


Fig 9: Power Dissipation

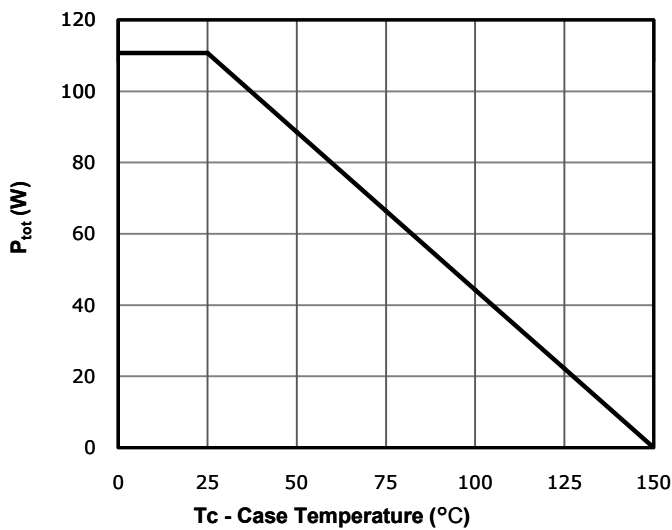


Fig 10: Drain Current Derating

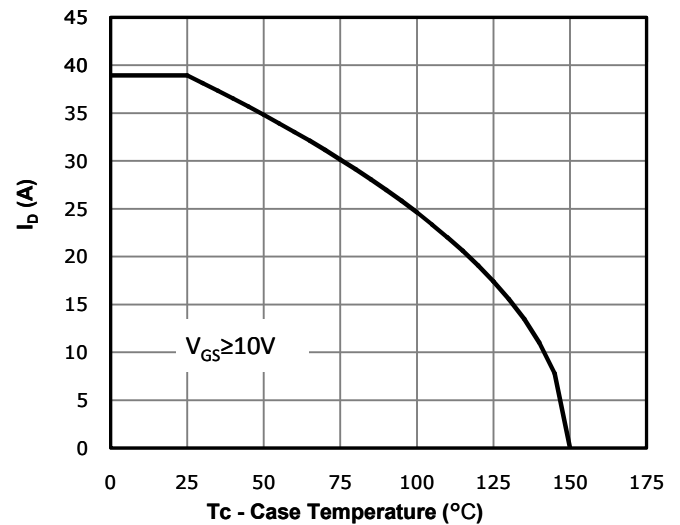


Fig 11: Safe Operating Area

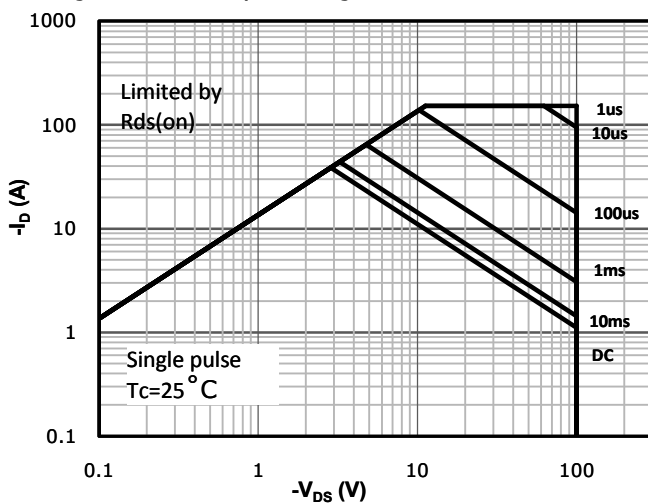
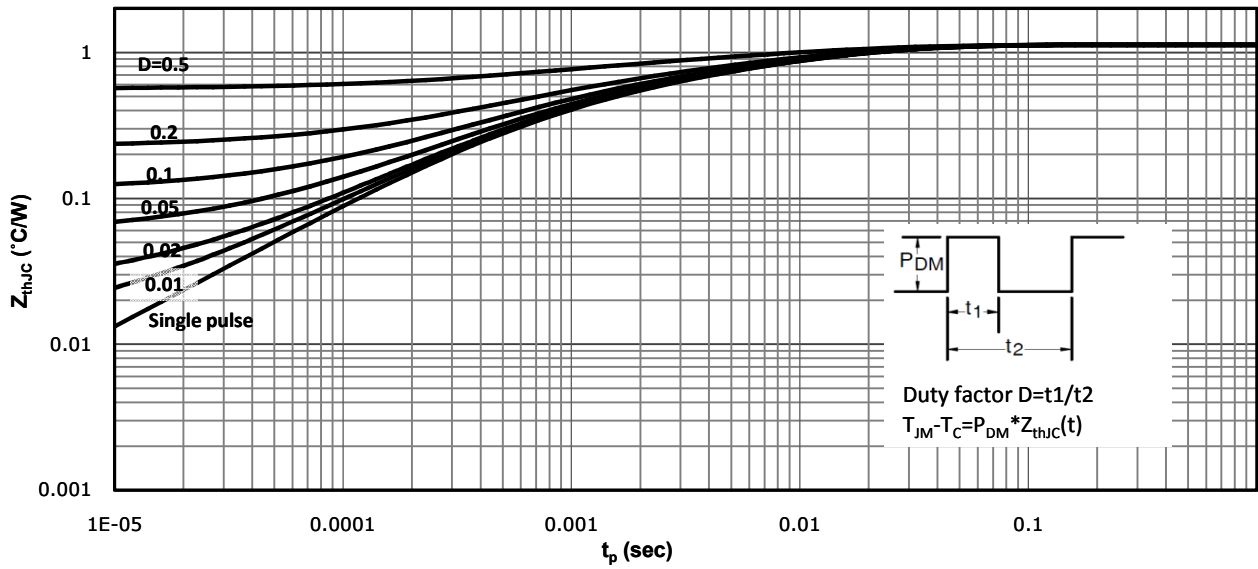




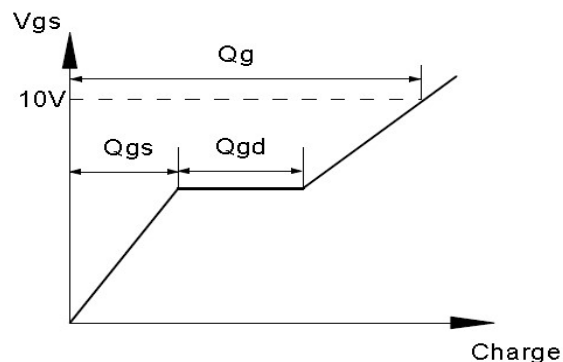
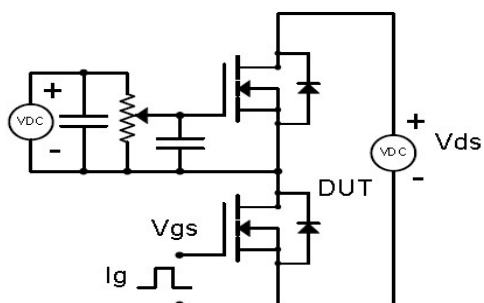
Fig 12: Max. Transient Thermal Impedance



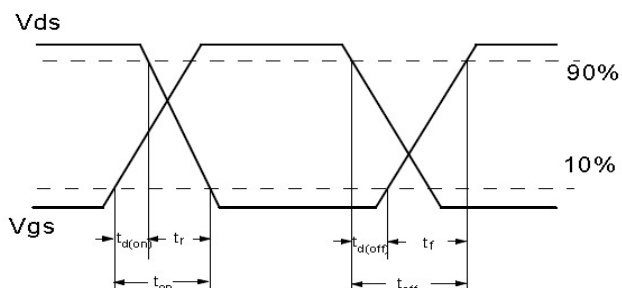
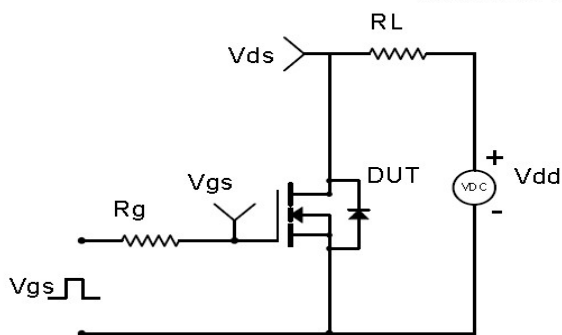


Test Circuit & Waveform

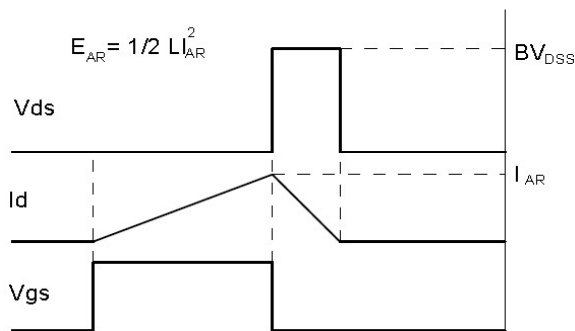
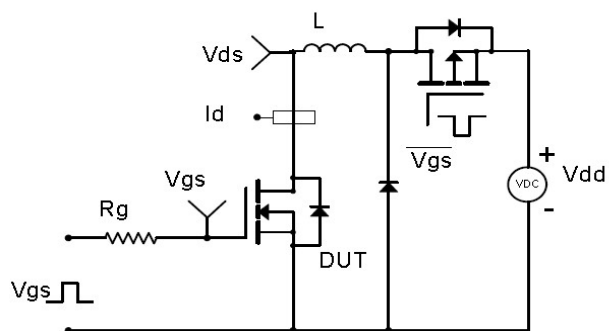
Gate Charge Test Circuit & Waveform



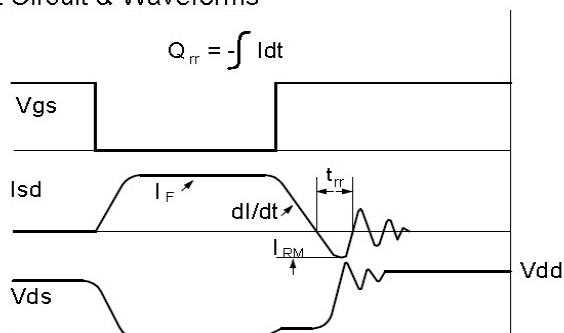
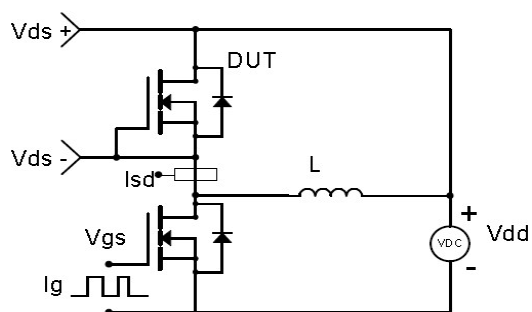
Resistive Switching Test Circuit & Waveforms



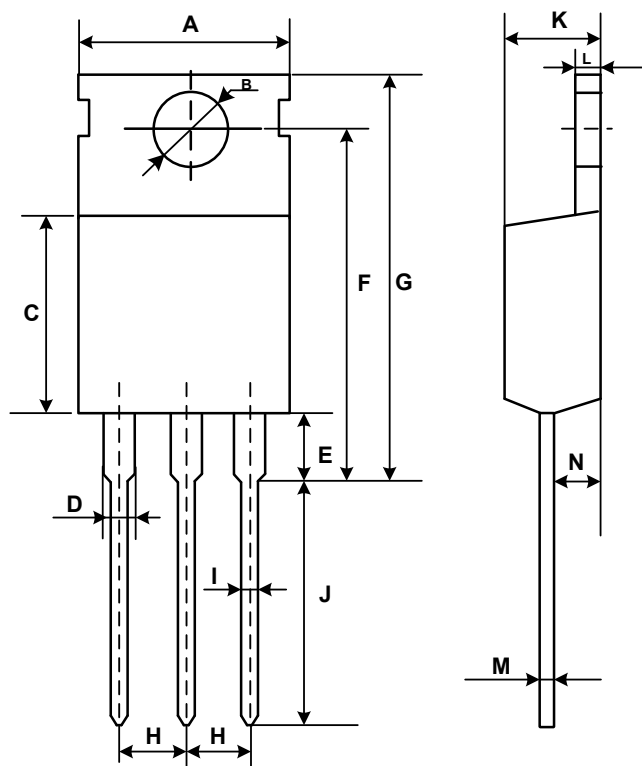
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Mechanical Dimensions for TO-220



COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	9.70	10.30
B	3.40	3.80
C	8.80	9.40
D	1.17	1.47
E	2.60	3.50
F	15.10	16.70
G	19.55MAX	
H	2.54REF	
I	0.70	0.95
J	9.35	11.00
K	4.30	4.77
L	1.20	1.45
M	0.40	0.65
N	2.20	2.60