

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

Product Summary



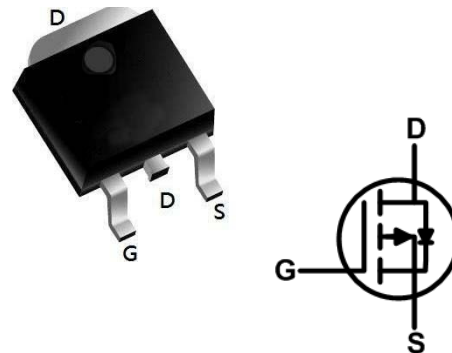
BVDSS	RDSON	ID
-100V	31mΩ	-40A

Description

The UD40P10 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 UD40P10 meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

TO252 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 -66 -21	A
Pulsed drain current ($T_C = 25^\circ\text{C}$, t_p limited by T_{jmax})	$I_{D \text{ pulse}}$	-135	A
Avalanche energy, single pulse ($L=0.5\text{mH}$, $R_g=25\Omega$)	E_{AS}	95	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation ($T_C = 25^\circ\text{C}$)	P_{tot}	94	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}	1.33	°C/W
Thermal resistance, junction – ambient(min. footprint)	R_{thJA}^*	129	

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	$V_{GS}=0V, I_D=-250\mu A$
Gate threshold voltage	$V_{GS(th)}$	-1.5	-2.0	-2.5	V	$V_{DS}=V_{GS}, I_D=-250\mu A$
Zero gate voltage drain current	I_{DSS}	-	-	-1	μA	$V_{DS}=-100V, V_{GS}=0V$ $T_j=25^{\circ}C$
		-	-	-50		$T_j=150^{\circ}C$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20V, V_{DS}=0V$
Drain-source on-state resistance	$R_{DS(on)}$	-	31	37	m Ω	$V_{GS}=-10V, I_D=-22A$ $T_j=25^{\circ}C$
		-	66	83		$T_j=150^{\circ}C$
		-	37	48		$V_{GS}=-4.5V, I_D=-10A$
Transconductance	g_{fs}	-	58	-	S	$V_{DS}=-5V, I_D=-22A$

Dynamic Characteristic

Input Capacitance	C_{iss}	-	5805	-	pF	$V_{GS}=0V, V_{DS}=-50V,$ $f=1\text{MHz}$
Output Capacitance	C_{oss}	-	178	-		
Reverse Transfer Capacitance	C_{rss}	-	86	-		
Gate Total Charge	Q_G	-	100	-	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}	-	16	-		
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	-	44	-		
Turn-off delay time	$t_{d(off)}$	-	90	-		
Fall time	t_f	-	76	-		
Gate resistance	R_G	-	3.8	-	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}	-	-0.87	-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}	-	33	-	ns	$I_{SD}=-22A, dI/dt=100A/\mu s$
Body Diode Reverse Recovery Charge	Q_{rr}	-	54	-	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

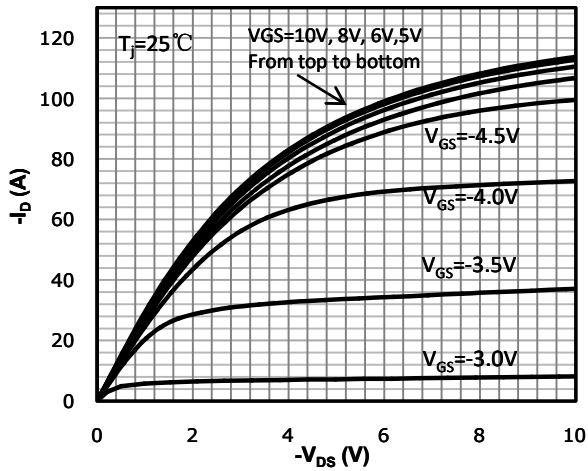


Fig 2: Transfer Characteristics

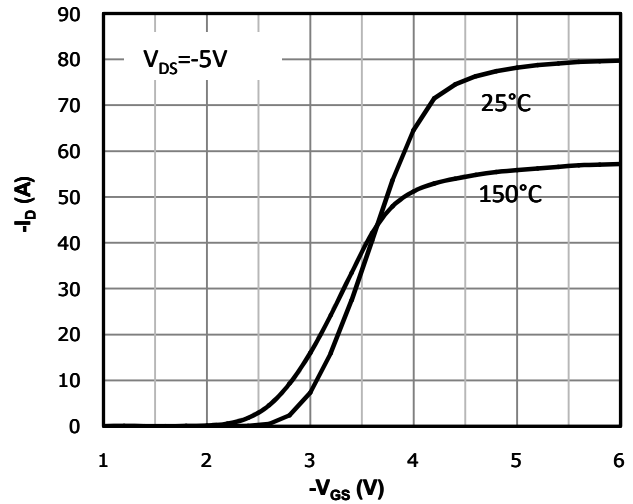


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

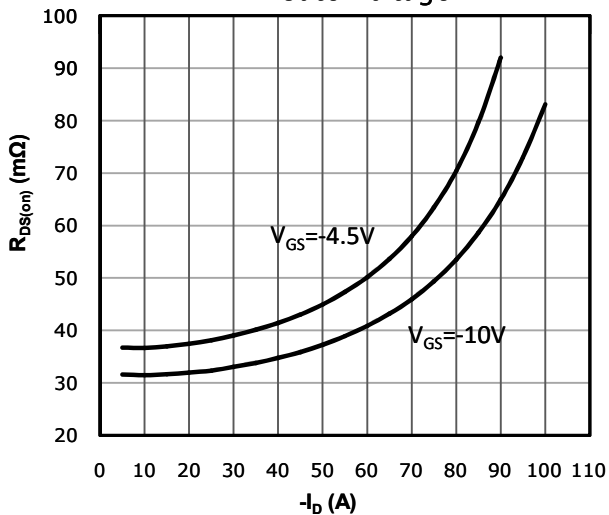


Fig 4: $R_{DS(on)}$ vs Gate Voltage

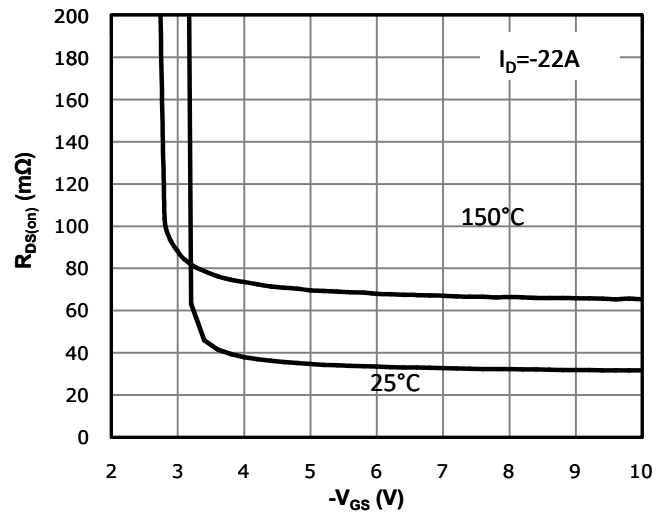


Fig 5: $R_{DS(on)}$ vs. Temperature

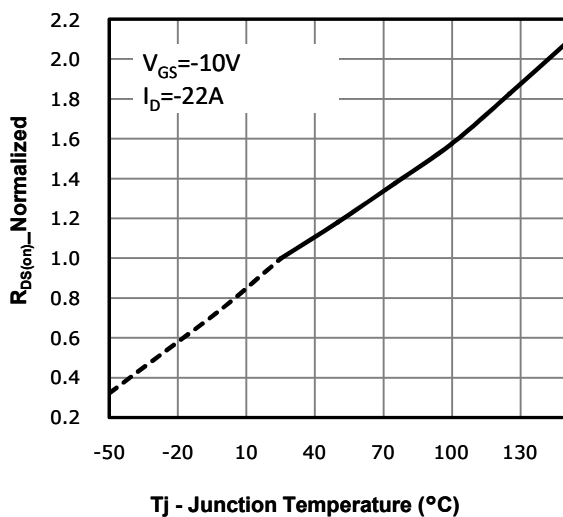


Fig 6: Capacitance Characteristics

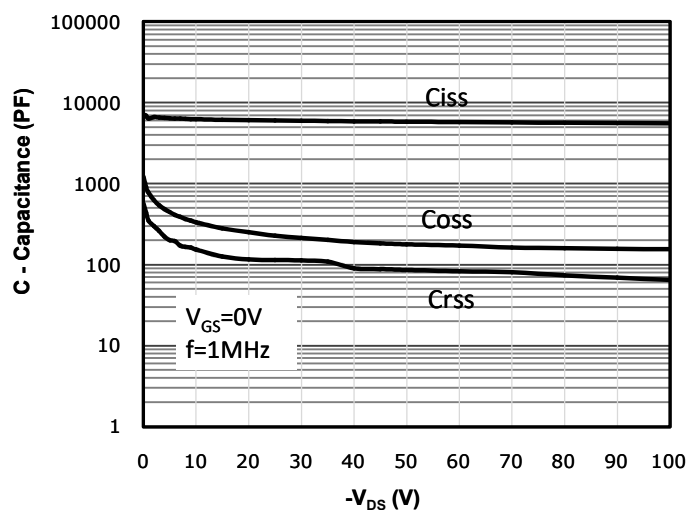




Fig 7: BVDS vs. Temperature

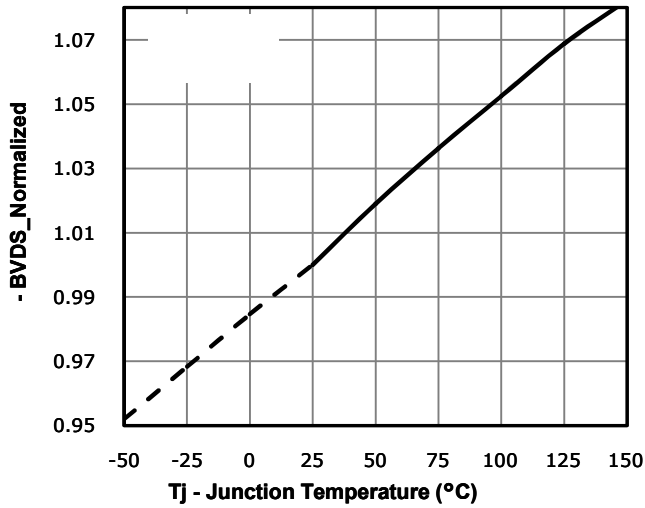


Fig 8: $V_{GS(th)}$ vs. Temperature

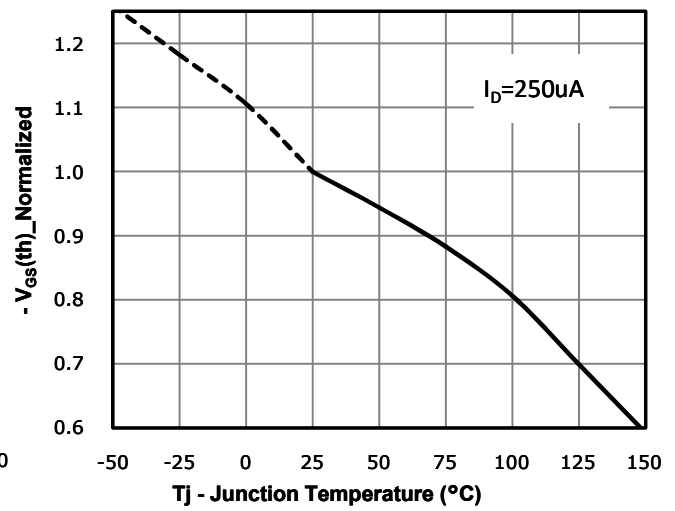


Fig 9: Gate Charge Characteristics

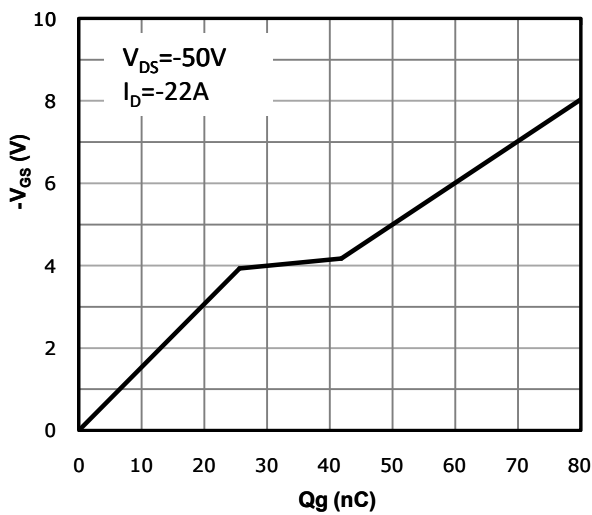


Fig 10: Body-diode Forward Characteristics

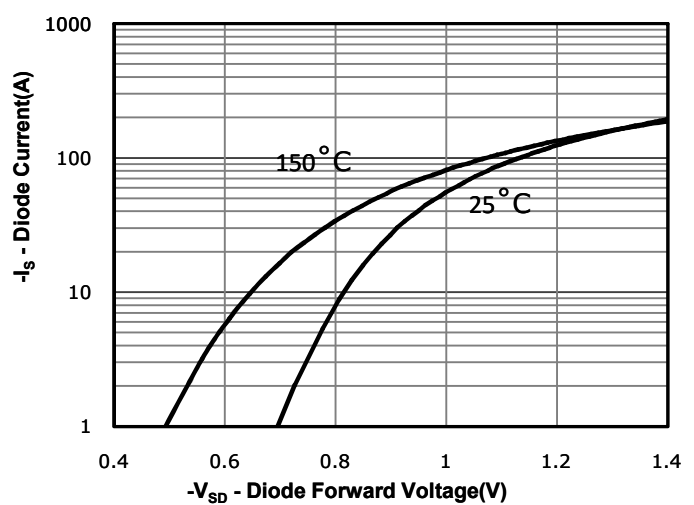


Fig 11: Power Dissipation

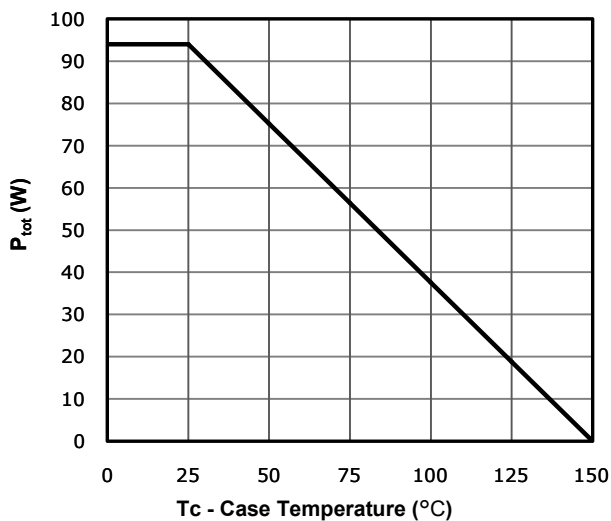


Fig 12: Drain Current Derating

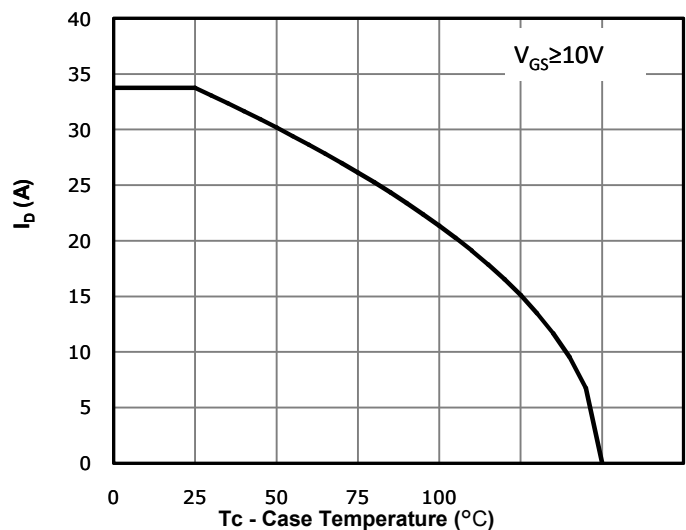




Fig 13: Safe Operating Area

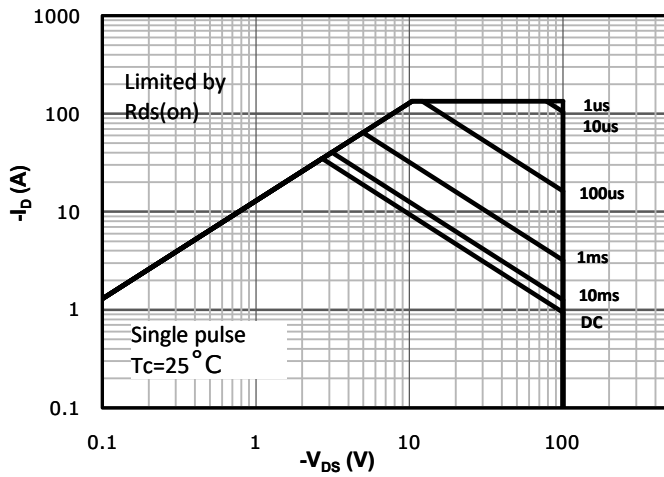
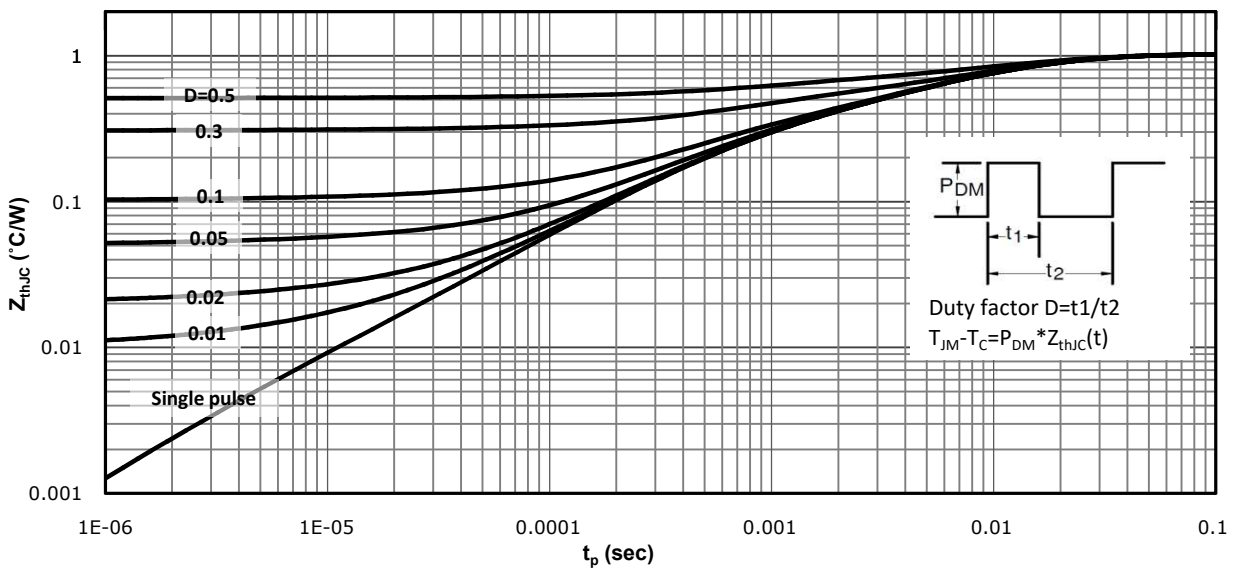
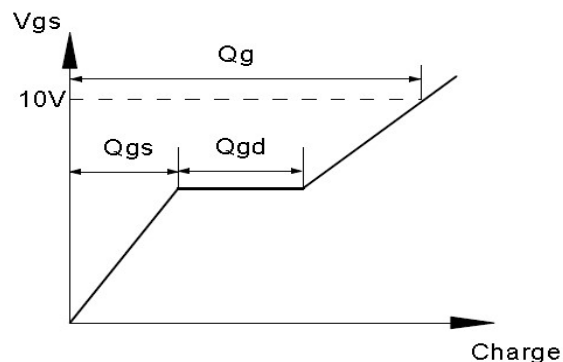
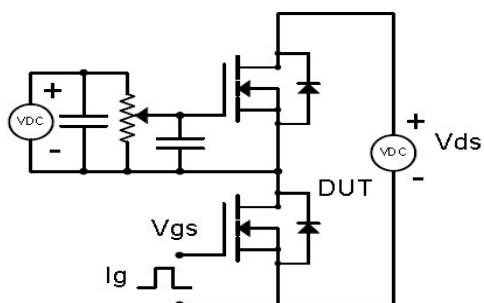


Fig 14: Max. Transient Thermal Impedance

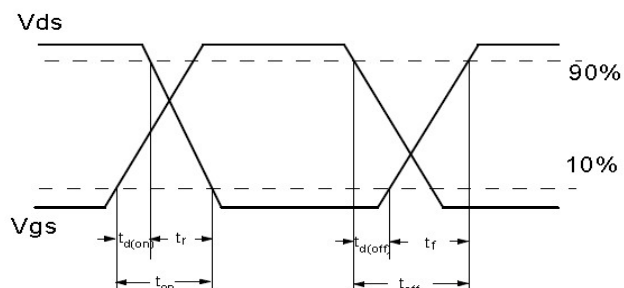
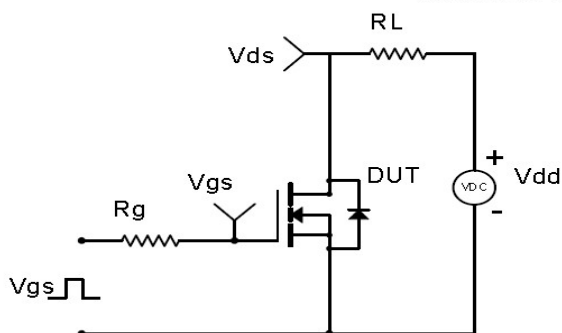


Test Circuit & Waveform

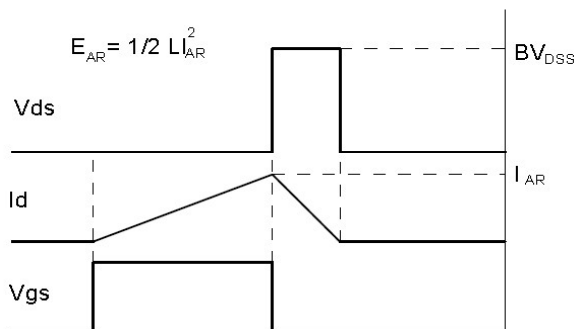
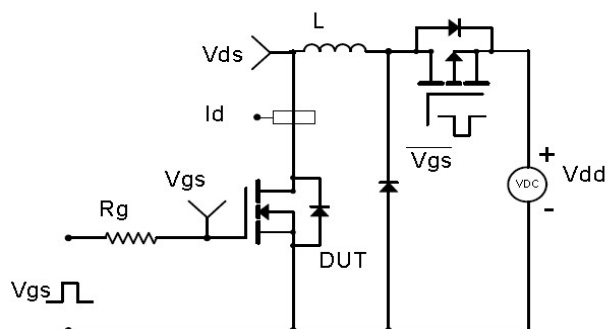
Gate Charge Test Circuit & Waveform



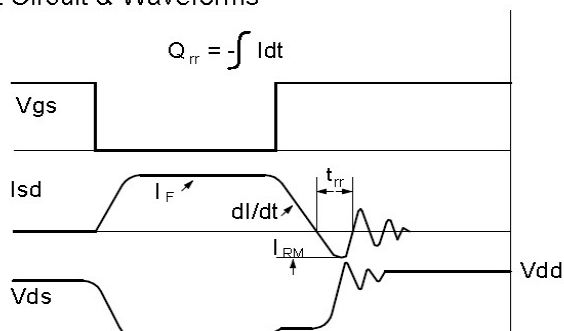
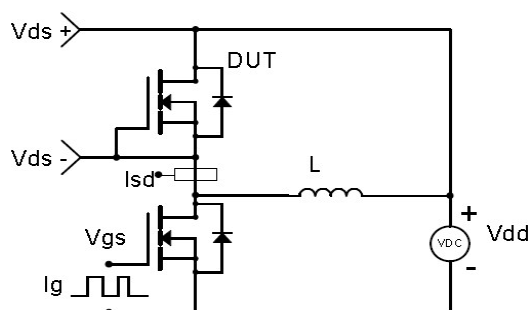
Resistive Switching Test Circuit & Waveforms



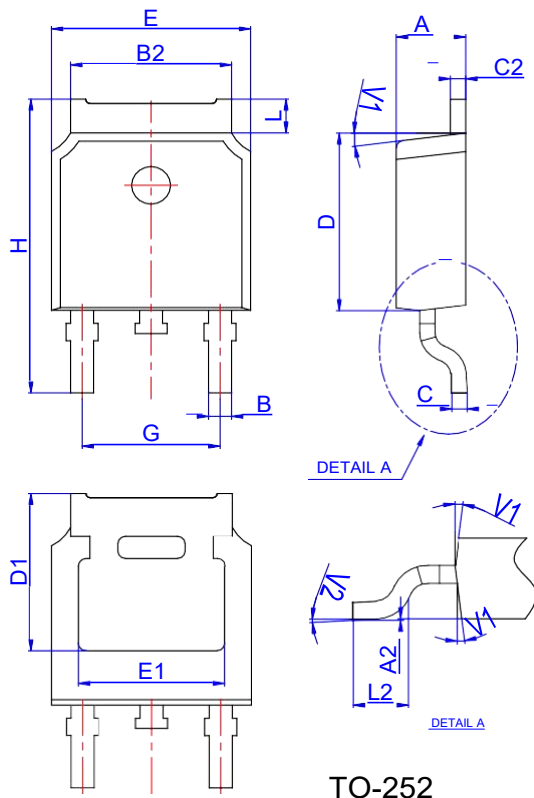
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

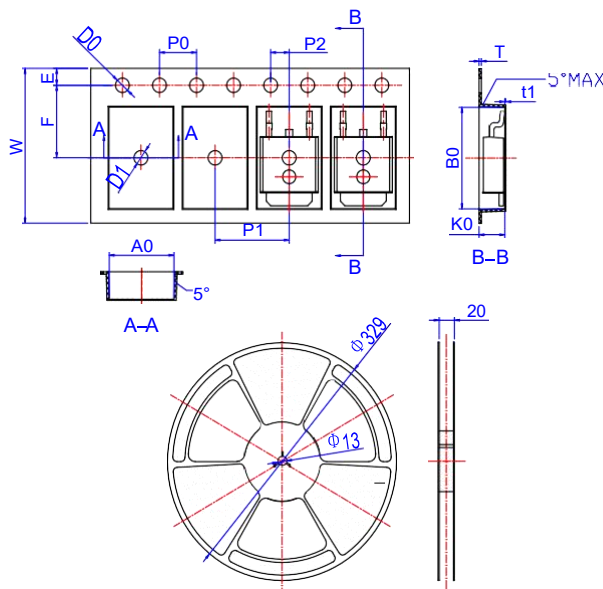


Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Reel Specification-TO-252-4R



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
W	15.90	16.00	16.10	0.626	0.630	0.634
E	1.65	1.75	1.85	0.065	0.069	0.073
F	7.40	7.50	7.60	0.291	0.295	0.299
D0	1.40	1.50	1.60	0.055	0.059	0.063
D1	1.40	1.50	1.60	0.055	0.059	0.063
P0	3.90	4.00	4.10	0.154	0.157	0.161
P1	7.90	8.00	8.10	0.311	0.315	0.319
P2	1.90	2.00	2.10	0.075	0.079	0.083
A0	6.85	6.90	7.00	0.270	0.271	0.276
B0	10.45	10.50	10.60	0.411	0.413	0.417
K0	2.68	2.78	2.88	0.105	0.109	0.113
T	0.24		0.27	0.009		0.011
t1	0.10			0.004		
10P0	39.80	40.00	40.20	1.567	1.575	1.583