

P-Ch 40V Fast Switching MOSFETs

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

Product Summary



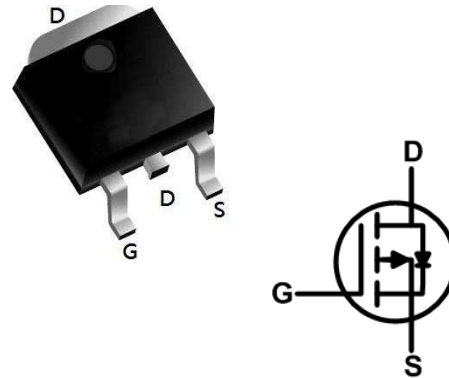
BVDSS	RDSON	ID
-40V	31mΩ	-23A

Description

The UD25P04 is the high cell density trench P-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The UD25P04 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings (T_C=25°C unless otherwise specified)

Symbol	Parameter		Max.	Units
V _{DSS}	Drain-Source Voltage		-40	V
V _{GSS}	Gate-Source Voltage		±20	V
I _D	Continuous Drain Current	T _C = 25°C	-23	A
		T _C = 100°C	-12	A
I _{DM}	Pulsed Drain Current ^{note1}		-40	A
E _{AS}	Single Pulsed Avalanche Energy ^{note2}		27.6	mJ
P _D	Power Dissipation	T _C = 25°C	8	W
R _{θJC}	Thermal Resistance, Junction to Case		18.8	°C/W
T _J , T _{STG}	Operating and Storage Temperature Range		-55 to +175	°C

Electrical Characteristics ($T_J=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
Off Characteristic						
V _{(BR)DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D = -250μA	-40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40V, V _{GS} =0V	-	-	-1	μA
I _{GSS}	Gate to Body Leakage Current	V _{DS} =0V, V _{GS} = ±20V	-	-	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D = -250μA	-1.0	-1.6	-2.5	V
R _{DS(on)}	Static Drain-Source on-Resistance note3	V _{GS} = -10V, I _D = -8A	-	31	44	mΩ
		V _{GS} = -4.5V, I _D = -5A	-	44	60	
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = -20V, V _{GS} =0V, f=1.0MHz	-	1034	-	pF
C _{OSS}	Output Capacitance		-	107	-	pF
C _{rSS}	Reverse Transfer Capacitance		-	79.5	-	pF
Q _g	Total Gate Charge	V _{DS} = -20V, I _D = -5A, V _{GS} = -10V	-	20	-	nC
Q _{gs}	Gate-Source Charge		-	3.5	-	nC
Q _{gd}	Gate-Drain(“Miller”) Charge		-	4.2	-	nC
Switching Characteristics						
t _{d(on)}	Turn-on Delay Time	V _{DD} = -20V, I _D = -5A, V _{GS} = -10V, R _{GEN} =2.5Ω	-	8	-	ns
t _r	Turn-on Rise Time		-	15	-	ns
t _{d(off)}	Turn-off Delay Time		-	23	-	ns
t _f	Turn-off Fall Time		-	9	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-23	A
I _{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-40	A
V _{SD}	Drain to Source Diode Forward Voltage	V _{GS} =0V, I _S = -10A	-	-0.8	-1.2	V
t _{rr}	Reverse Recovery Time	V _G S =0V, I _S =-5A,	-	29	-	ns
Q _{rr}	Reverse Recovery Charge	di/dt=100A/μs	-	20	-	nC

Notes:1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition: $T_J=25^\circ\text{C}$, $V_{DD}=-20V$, $V_G=-10V$, $L=0.5mH$, $R_G=25\Omega$, $I_{AS}=-10.5A$

3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

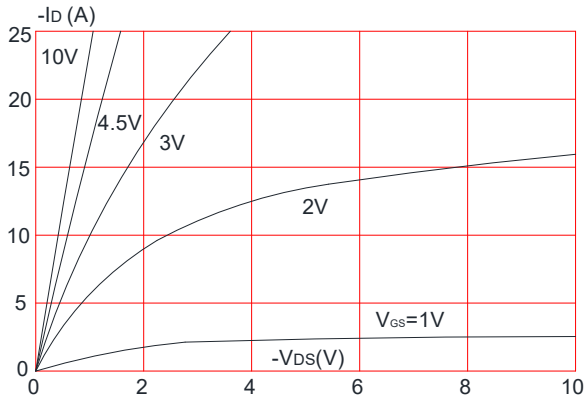


Figure 2: Typical Transfer Characteristics

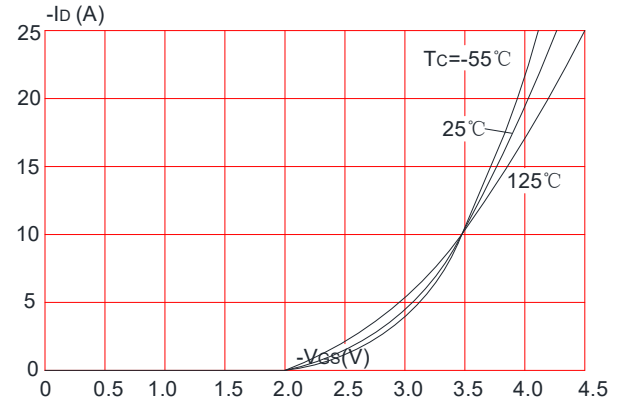


Figure 3: On-resistance vs. Drain Current

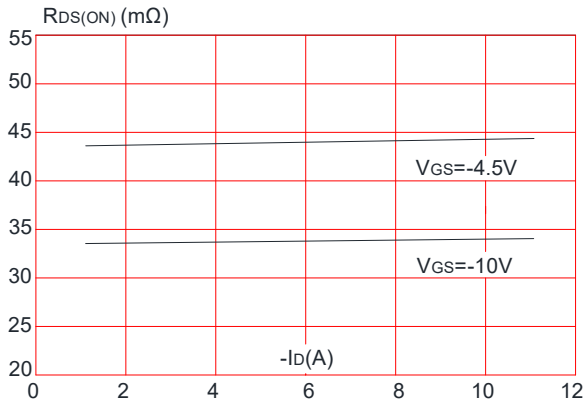


Figure 4: Body Diode Characteristics

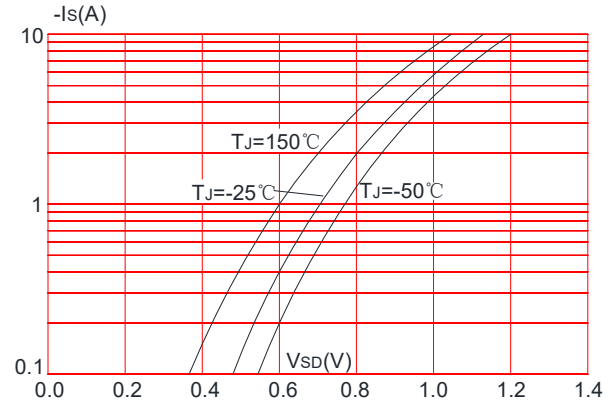


Figure 5: Gate Charge Characteristics

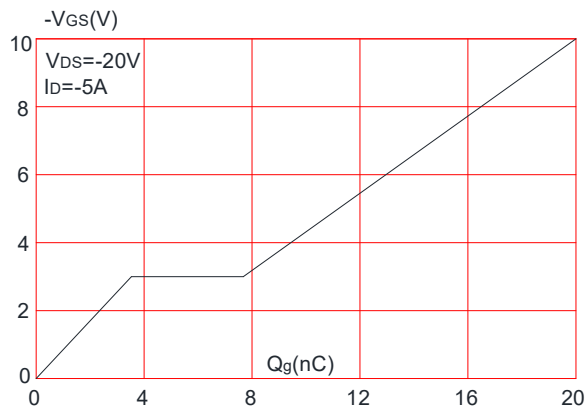
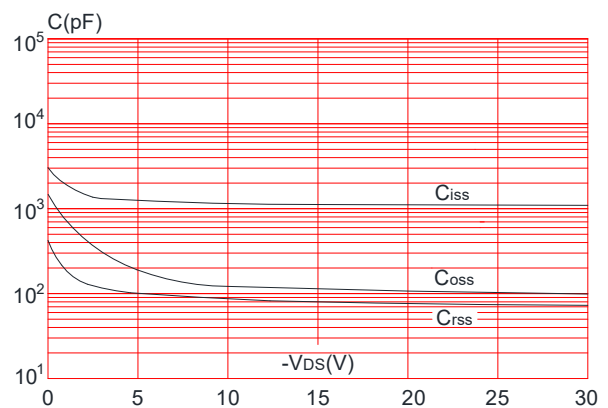


Figure 6: Capacitance Characteristics



P-Ch 40V Fast Switching MOSFETs

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

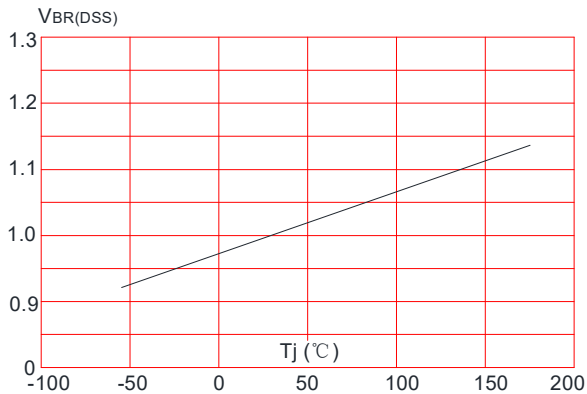


Figure 8: Normalized on Resistance vs. Junction Temperature

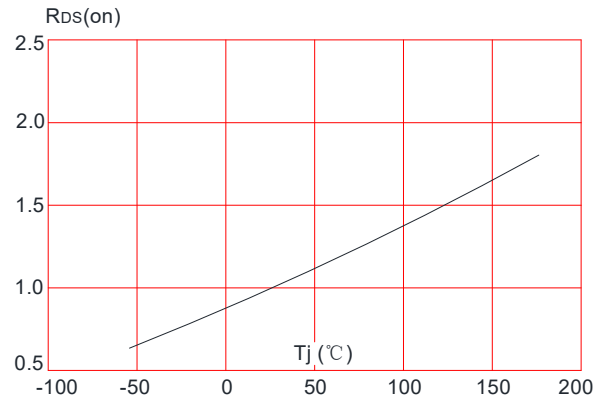


Figure 9: Maximum Safe Operating Area

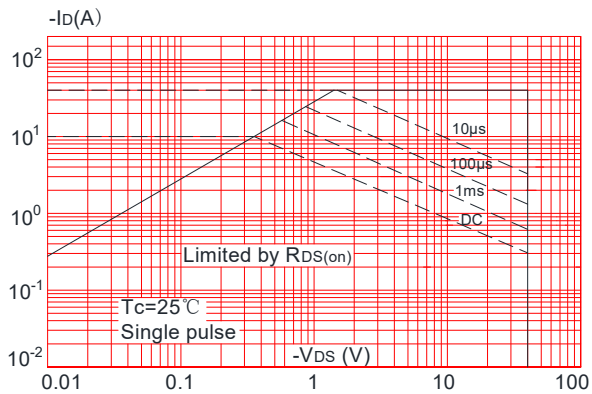


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

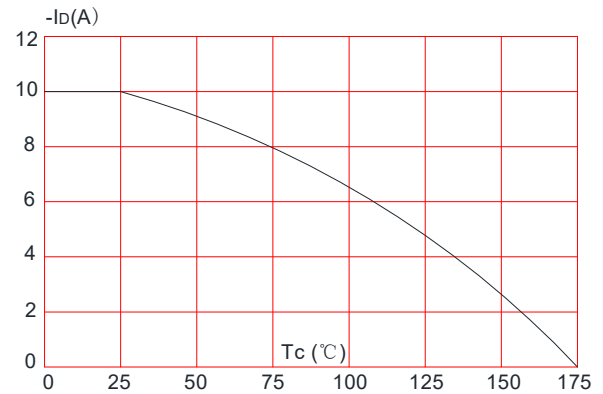
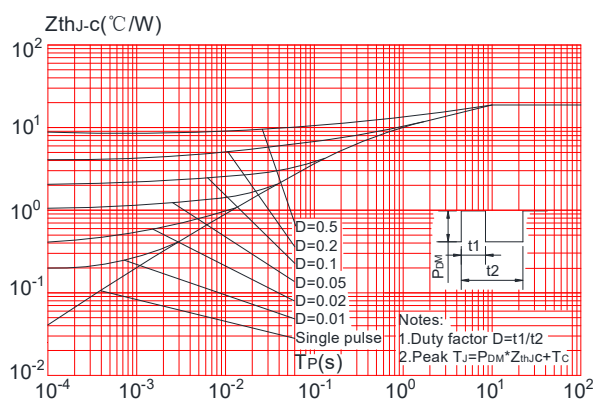
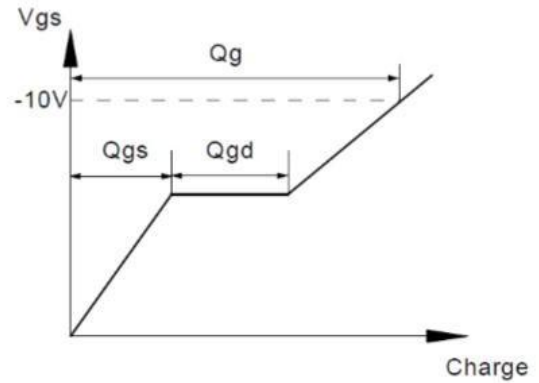
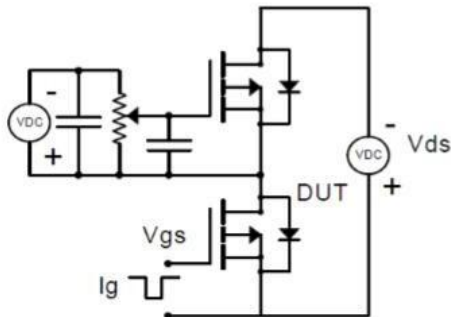


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

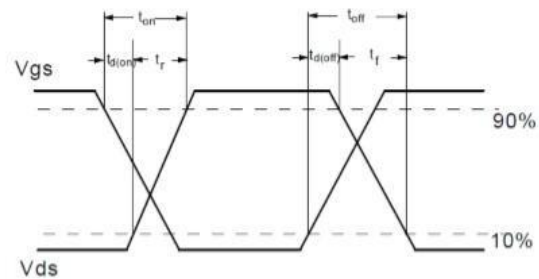
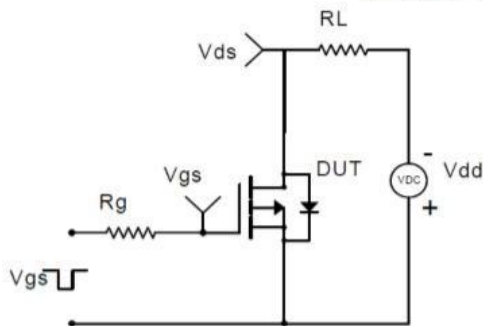


Test Circuit

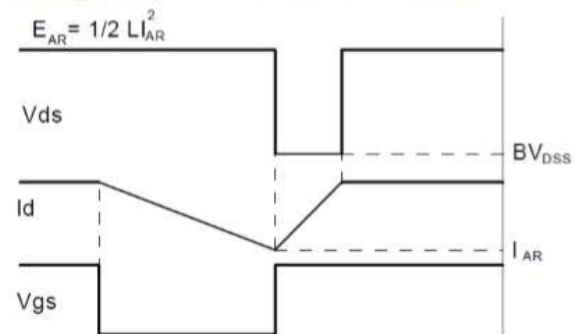
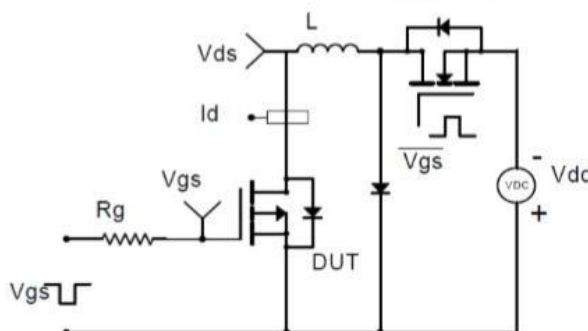
Gate Charge Test Circuit & Waveform



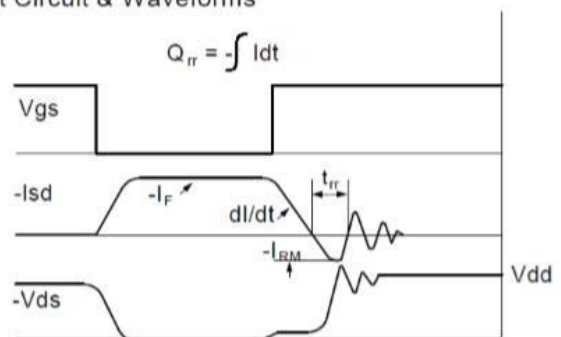
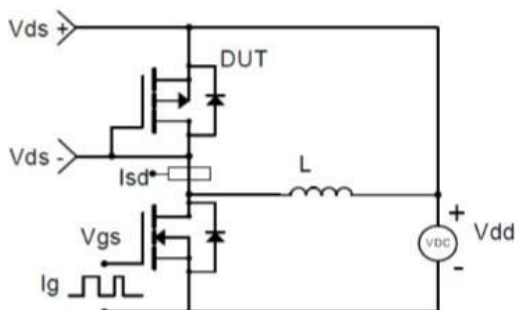
Resistive Switching Test Circuit & Waveforms



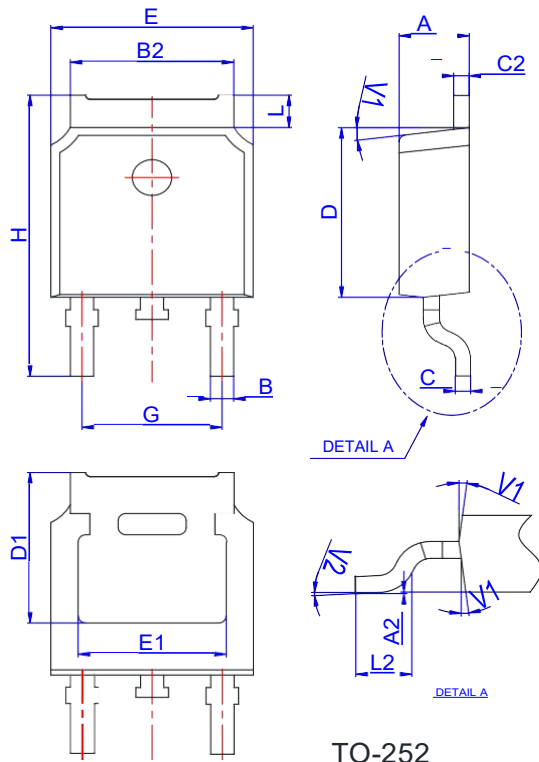
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

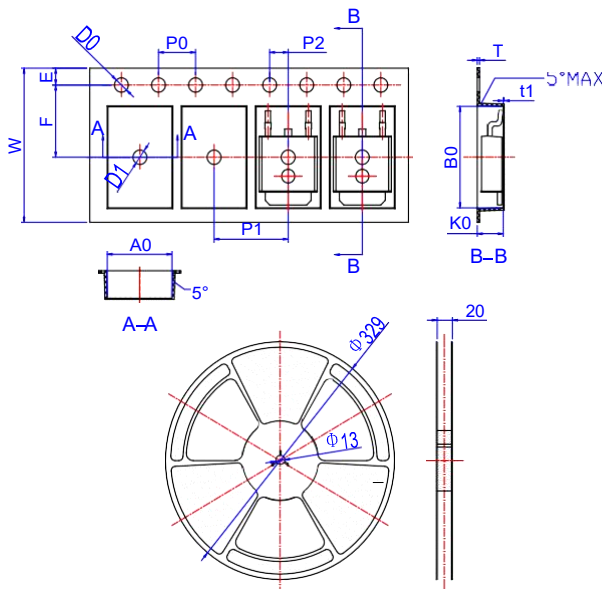


Package Mechanical Data-TO-252



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°

Carrier Specification-TO-252



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