

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

Product Summary

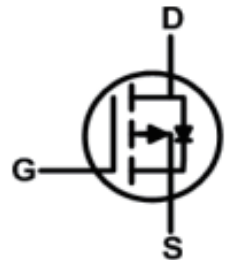
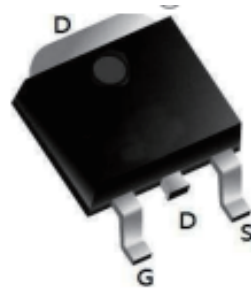


BVDSS	RDS(on)	ID
-20V	9mΩ	-50A

Description

The 50P02 is the high cell density trenched P-ch MOSFETs, which provides excellent RDS(on) and gate charge for most of the synchronous buck converter applications. The 50P02 meets the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

TO252 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
V _{DS}	Drain-Source Voltage	-20	V
V _{GS}	Gate-Source Voltage	±12	V
I _D @T _C =25°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-50	A
I _D @T _C =70°C	Continuous Drain Current, V _{GS} @ -4.5V ¹	-25	A
I _{DM}	Pulsed Drain Current ²	-68	A
P _D @T _C =25°C	Total Power Dissipation ³	38	W
P _D @T _C =70°C	Total Power Dissipation ³	18	W
T _{STG}	Storage Temperature Range	-55 to 150	°C
T _J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Max.	Unit
R _{θJA}	Thermal Resistance Junction-Ambient ¹	75	°C/W
R _{θJA}	Thermal Resistance Junction-Ambient ¹ (t ≤ 10s)	40	°C/W
R _{θJC}	Thermal Resistance Junction-Case ¹	4.2	°C/W

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

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V
$\Delta BV_{DSS} / \Delta T_J$	BV_{DSS} Temperature Coefficient	Reference to 25°C , $I_D=-1\text{mA}$	---	-0.012	---	$V/^\circ\text{C}$
		$V_{GS}=-4.5V, I_D=-10A$	---	9	13	$\text{m}\Omega$
$R_{DS(ON)}$	Static Drain-Source On-Resistance ²	$V_{GS}=-2.5V, I_D=-8A$	---	12	18	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.4	-0.7	-1	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	2.94	---	$\text{mV}/^\circ\text{C}$
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-15V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA
g_{fs}	Forward Transconductance	$V_{DS}=-5V, I_D=-10A$	---	43	---	S
Q_g	Total Gate Charge (-4.5V)		---	35	---	nC
Q_{gs}	Gate-Source Charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-10A$	---	5	---	
Q_{gd}	Gate-Drain Charge		---	10	---	
$T_{d(on)}$	Turn-On Delay Time		---	12	---	ns
T_r	Rise Time	$V_{DD}=-10V, V_{GS}=-4.5V, R_G=3.3\Omega, I_D=-10A$	---	40	---	
$T_{d(off)}$	Turn-Off Delay Time		---	30	---	
T_f	Fall Time		---	10	---	
C_{iss}	Input Capacitance		---	2800	---	pF
C_{oss}	Output Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	690	---	
C_{rss}	Reverse Transfer Capacitance		---	590	---	

Diode Characteristics

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Units
I_S	Continuous Source Current ^{1,4}	$V_G=V_D=0V$, Force Current	---	---	-50	A
I_{SM}	Pulsed Source Current ^{2,4}		---	---	---	A
V_{SD}	Diode Forward Voltage ²	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V
t_{rr}	Reverse Recovery Time	$I_F=-10A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	27	---	nS
Q_{rr}	Reverse Recovery Charge		---	17.8	---	nC

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
3. The power dissipation is limited by 150°C junction temperature
4. The data is theoretically the same as I_D and I_{DM} , in real applications, should be limited by total power dissipation.

Typical Electrical and Thermal Characteristics (Curves)

Figure 1: Output Characteristics

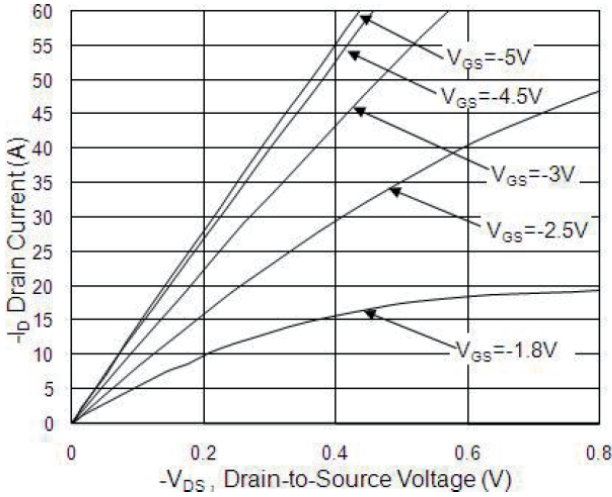


Figure 2: On-Resistance vs. G-S Voltage

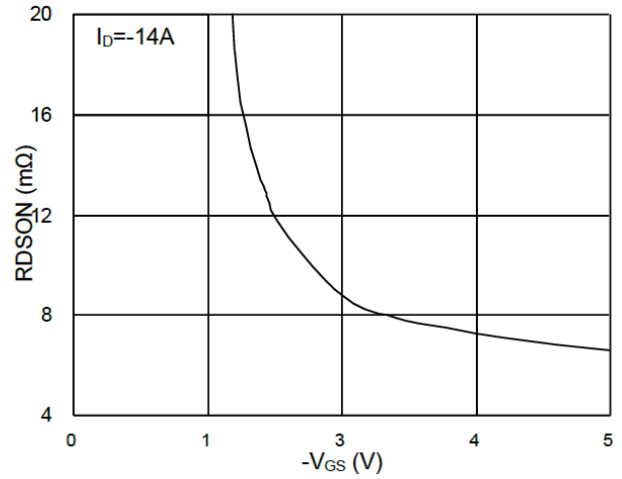


Figure 3: Forward Characteristics of Reverse

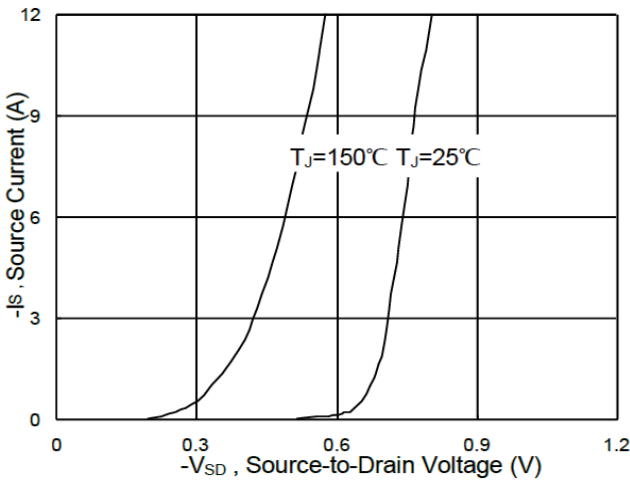


Figure 4: Gate-charge Characteristics

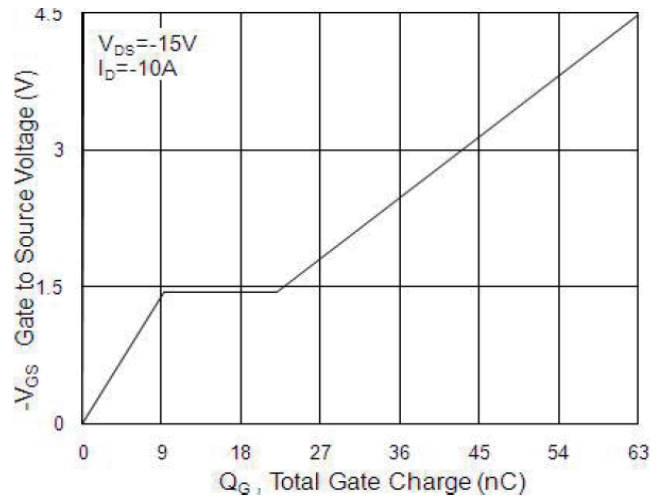


Figure 5: Normalized VGS(th) vs. TJ

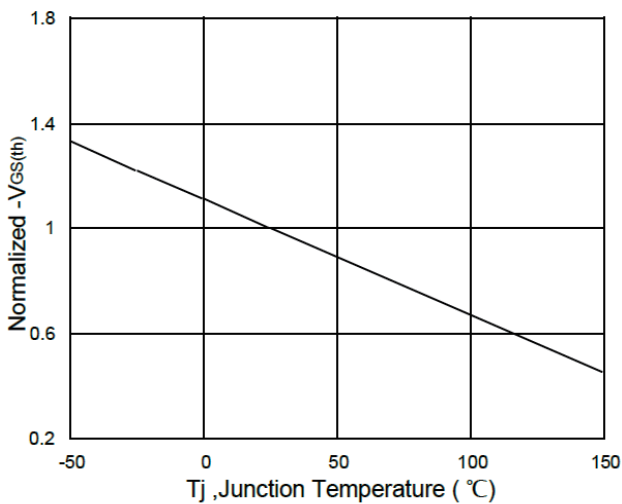
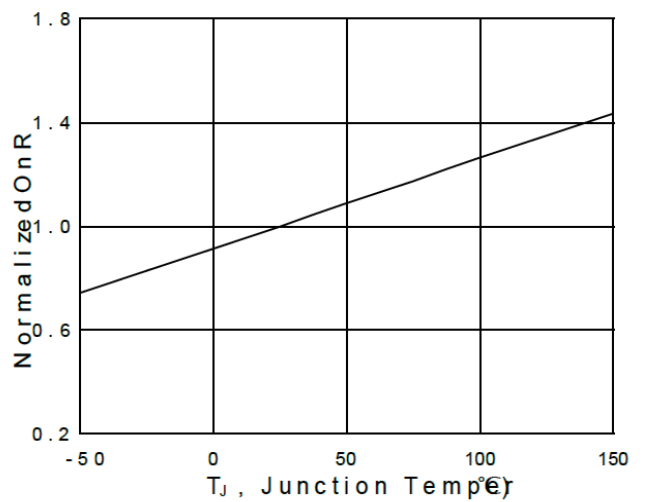


Figure 6: Normalized RDSON vs. TJure



Typical Performance Characteristics

Figure 7: Capacitance

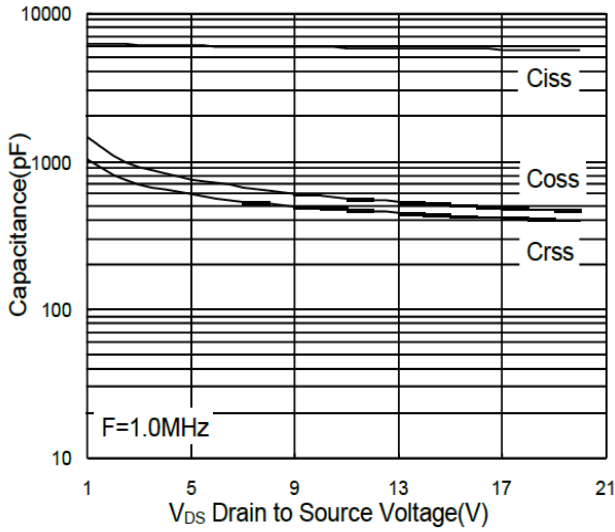


Figure 8: Safe Operating Area

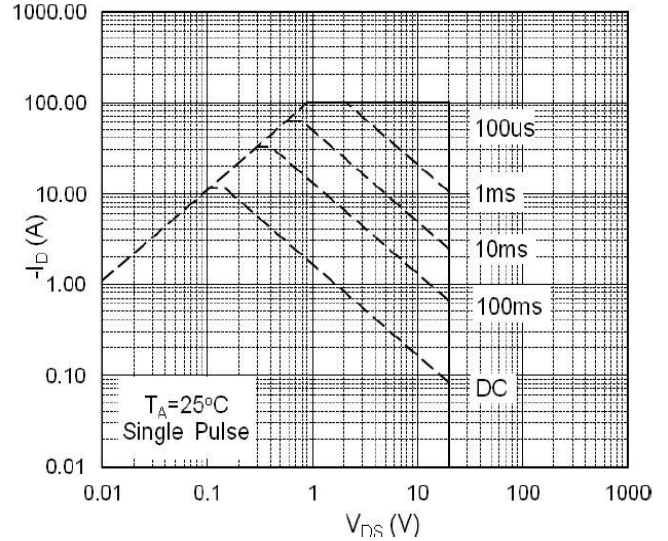


Figure 9: Normalized Maximum Transient Thermal Impedance

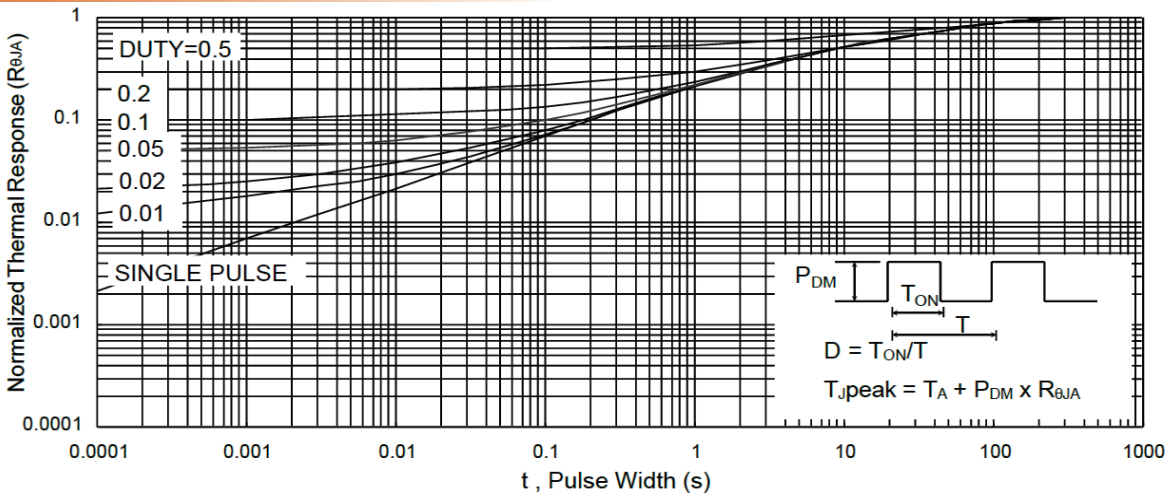


Figure 10: Switching Time Waveforms

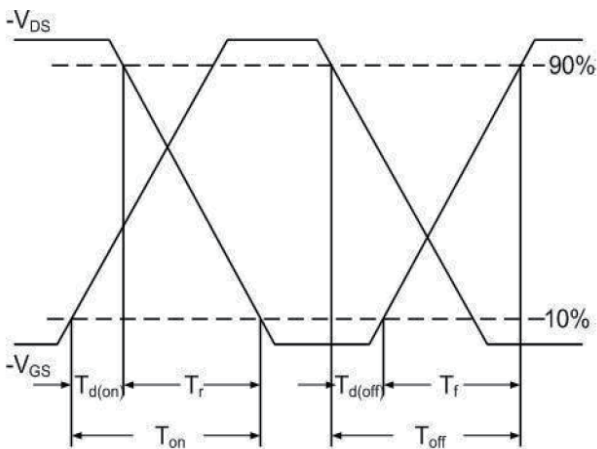
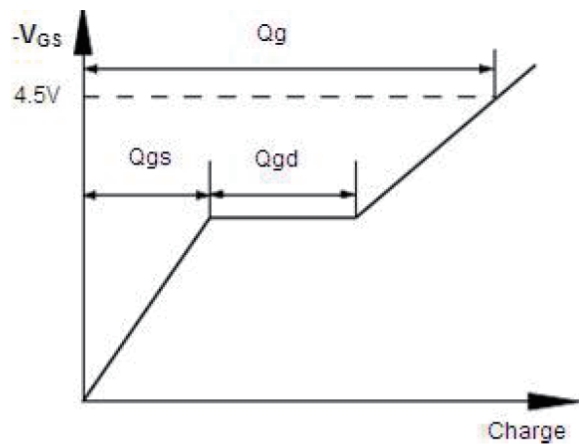
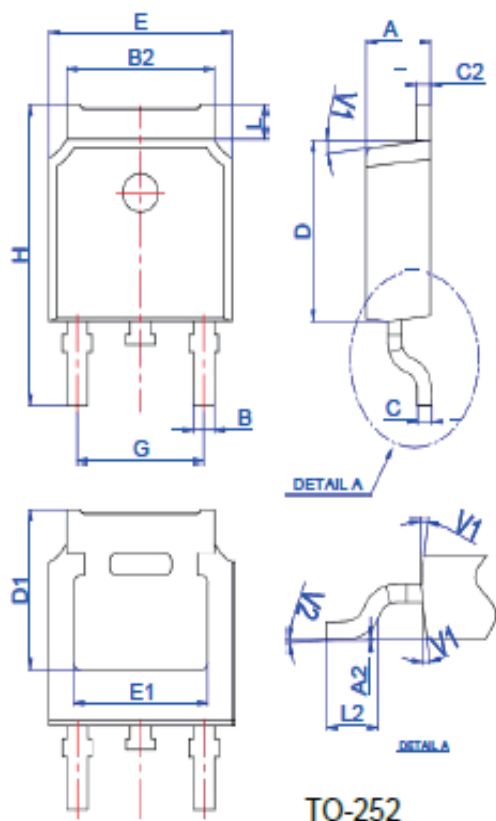


Figure 11: Gate Charge Waveform



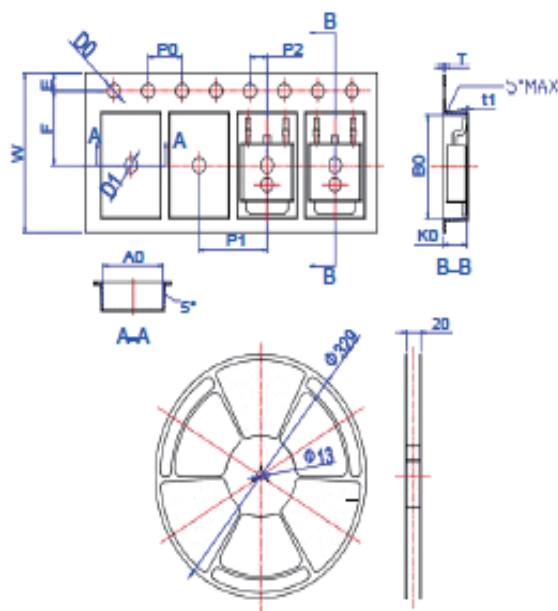
Package Mechanical Data TO 252



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	0.68		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°

TO-252

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