

Description

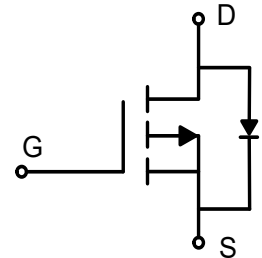
TF350P04K uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- $V_{DS} = -40V$, $I_D = -24A$
 $R_{DS(on)} = 32m\Omega$ Typ@ $V_{GS} = -10V$
 $R_{DS(on)} = 42m\Omega$ Typ@ $V_{GS} = -4.5V$
- Extremely Low Switching Loss
- Excellent Stability and Uniformity
- Low Gate Charge
- 100% EAS Guaranteed

Applications

- Power Management Switches
- DC/DC Converter



Absolute Maximum Ratings ($T_A = 25^\circ C$, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	-40	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_C = 25^\circ C$	I_D	-24	A
	$T_C = 100^\circ C$		-15	
Pulsed Drain Current ¹		I_{DM}	-76	A
Single Pulse Avalanche Energy ²		EAS	55	mJ
Total Power Dissipation	$T_C = 25^\circ C$	P_D	20	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	$R_{\theta JA}$	73	$^\circ C/W$
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	17	$^\circ C/W$

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

Parameter		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics							
Drain-Source Breakdown Voltage		V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-40	-	-	V
Gate-body Leakage current		I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	T _J = 25°C	I _{DSS}	V _{DS} = -40V, V _{GS} = 0V	-	-	-1	μA
	T _J = 100°C			-	-	-100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.7	-2.5	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = -10V, I _D = -8.0A	-	32	40	mΩ
			V _{GS} = -4.5V, I _D = -5.0A		42	55	
Forward Transconductance ⁴		g _{fs}	V _{DS} = -5V , I _D = -10.0A	-	15	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = -20V, V _{GS} = 0V, f = 1MHz	-	1021	-	pF
Output Capacitance		C _{oss}		-	63.6	-	
Reverse Transfer Capacitance		C _{rss}		-	48.6	-	
Gate Resistance		R _g	f = 1MHz	-	4.7	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = -10V, V _{DS} = -20V, I _D = -10A	-	19.3	-	nC
Gate-Source Charge		Q _{gs}		-	2.5	-	
Gate-Drain Charge		Q _{gd}		-	5.5	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} = -10V, V _{DD} = -20V, R _G = 2.5Ω, I _D = -10A	-	13.0	-	ns
Rise Time		t _r		-	16.0	-	
Turn-Off Delay Time		t _{d(off)}		-	180	-	
Fall Time		t _f		-	86.0	-	
Body Diode Reverse Recovery Time		t _{rr}	I _F = -5.0A,dI/dt= 100A/μs	-	29	-	ns
Body Diode Reverse Recovery Charge		Q _{rr}		-	20	-	nC
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = -10A, V _{GS} = 0V	-	0.85	-1.2	V
Continuous Source Current	T _C = 25°C	I _S	-	-	-	-10	A

Notes:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$.
2. The EAS data shows Max. rating . The test condition is $V_{DD} = -20V, V_{GS} = -10V, L = 0.5mH, I_{AS} = -10A$
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Electrical And Thermal Characteristics (Curves)

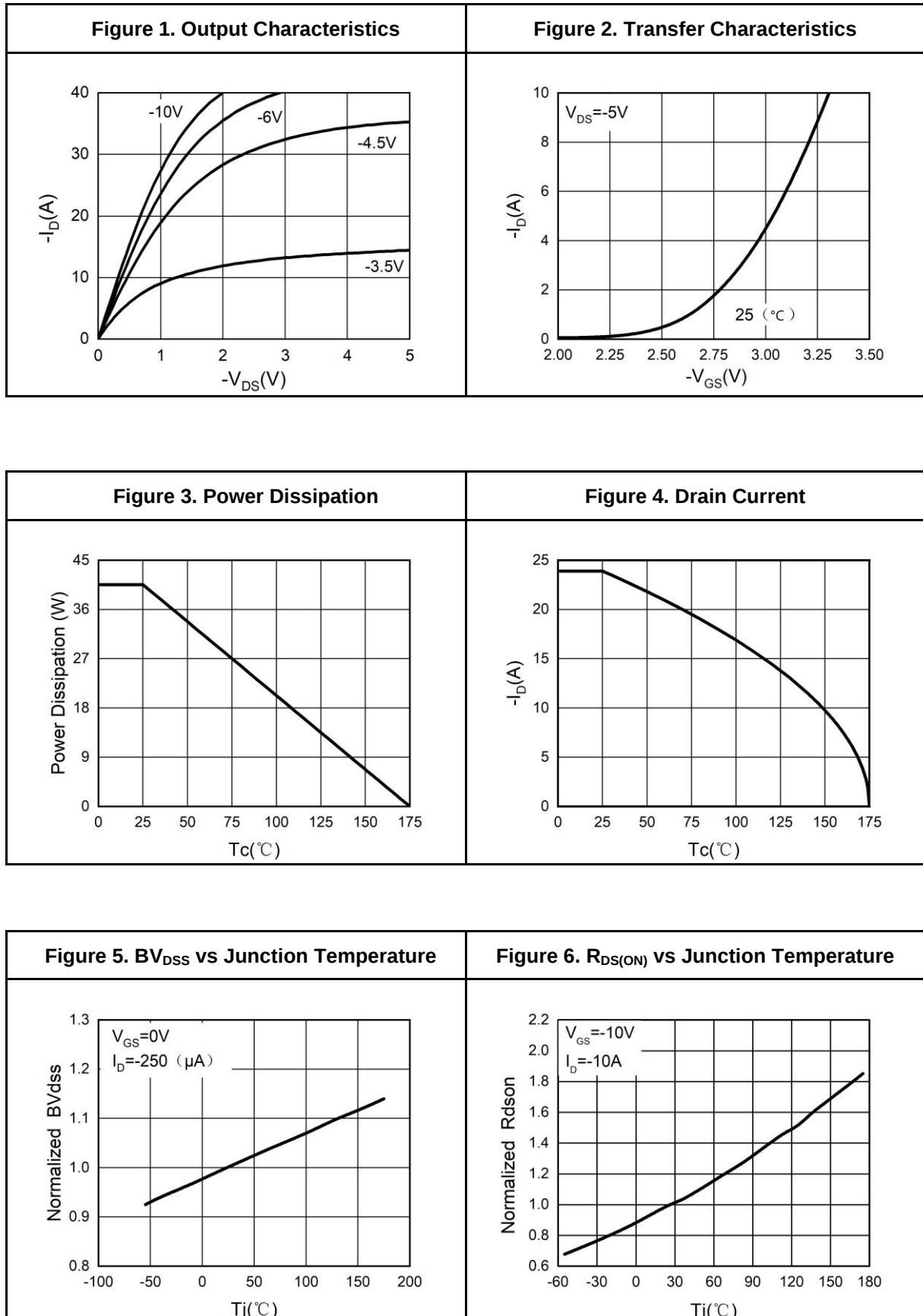


Figure 7. Gate Charge Waveforms

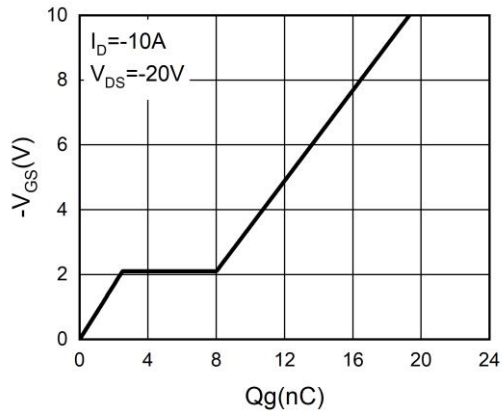


Figure 8. Capacitance

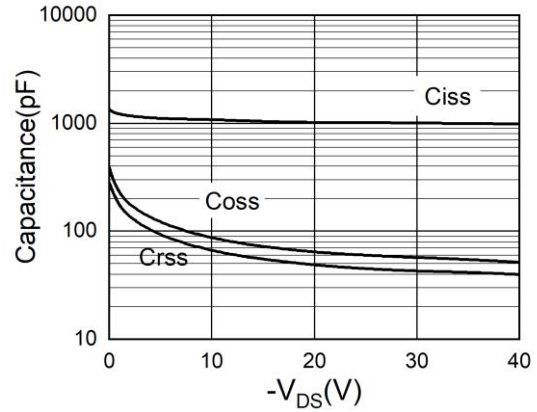


Figure 9. Body-Diode Characteristics

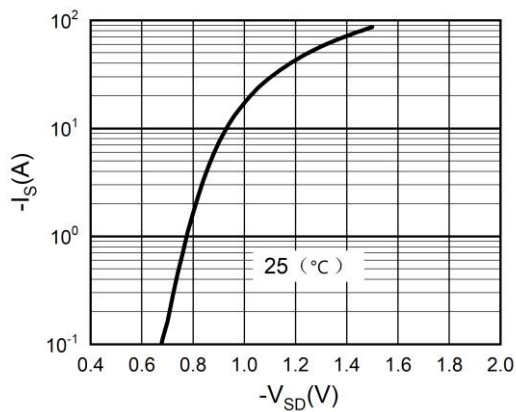
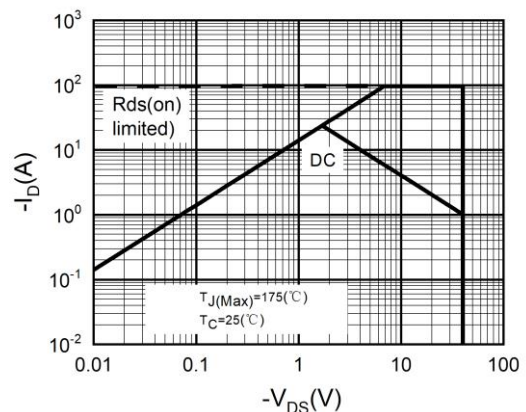


Figure 10. Maximum Safe Operating Area



Test Circuit

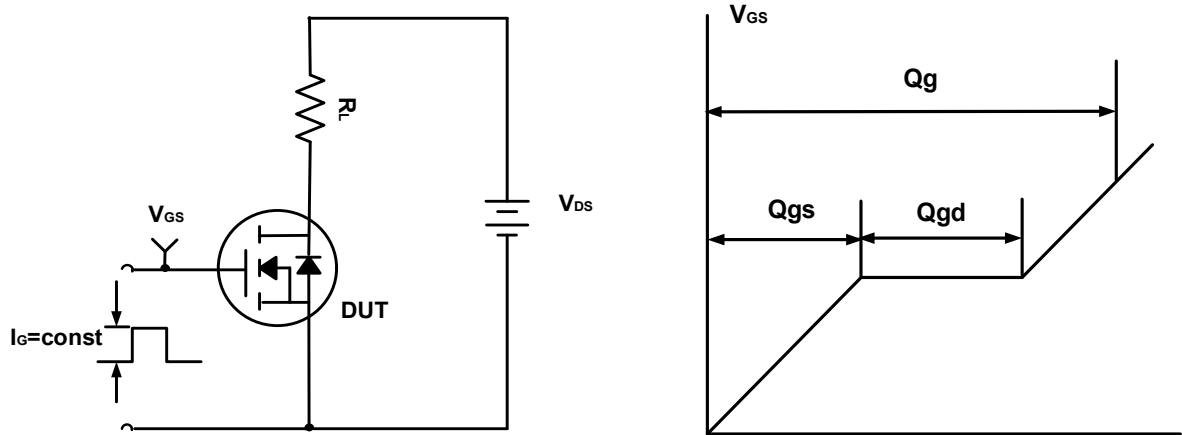


Figure A. Gate Charge Test Circuit & Waveforms

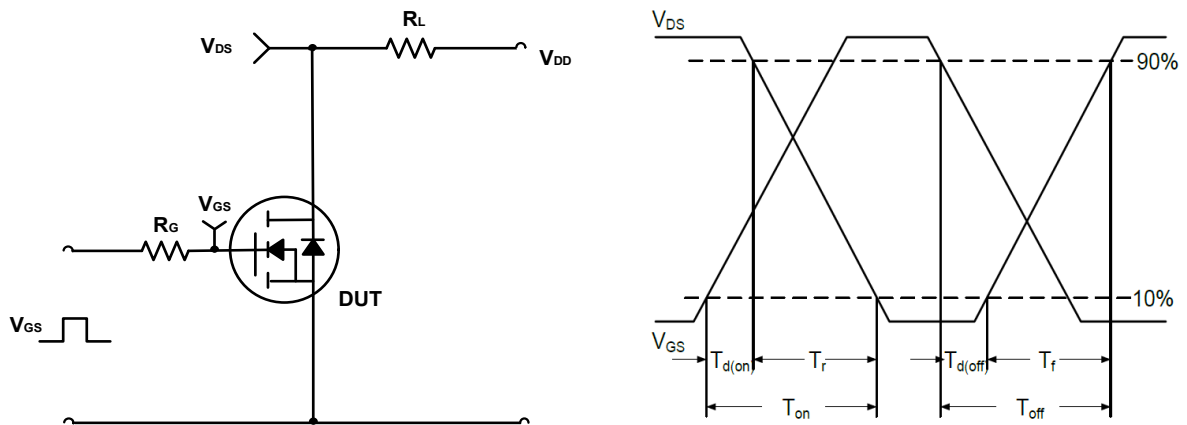


Figure B. Switching Test Circuit & Waveforms

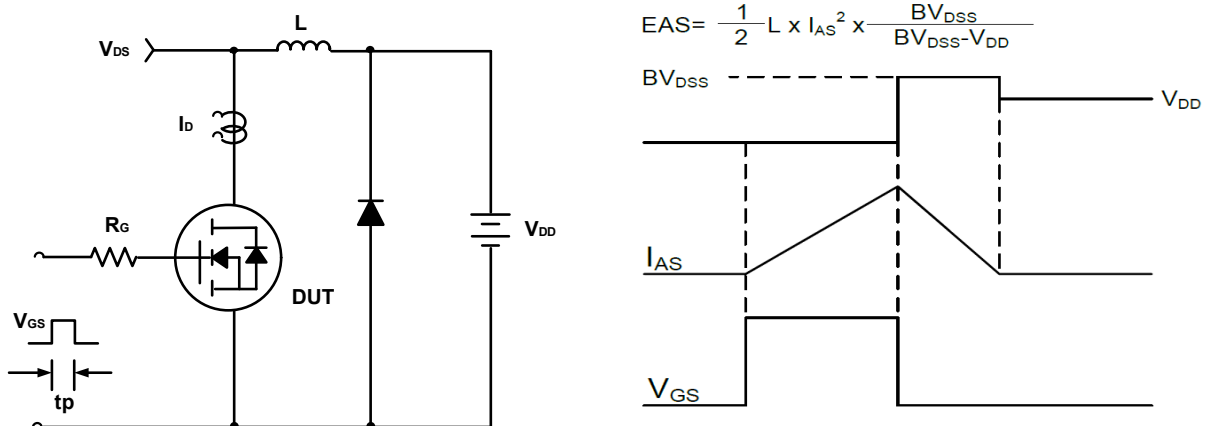
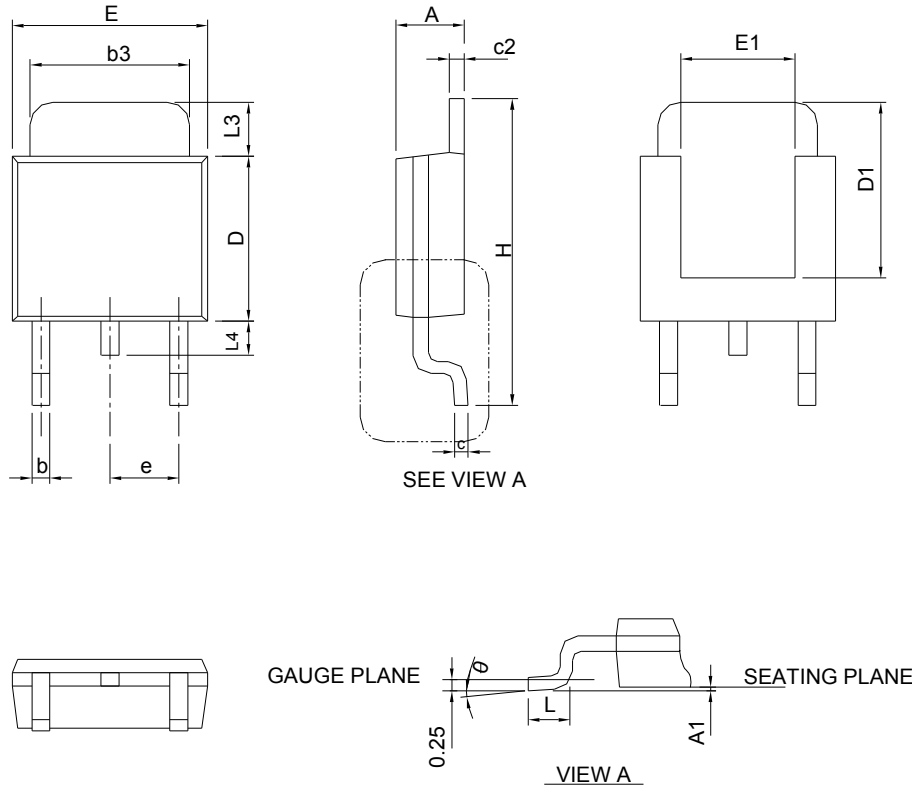


Figure C. Unclamped Inductive Switching Circuit & Waveforms

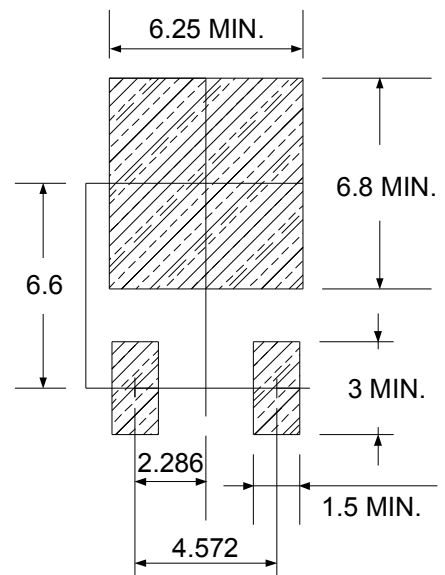
Package Information

TO-252



SYMBOL	TO-252			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	2.18	2.39	0.086	0.094
A1		0.13		0.005
b	0.50	0.89	0.020	0.035
b3	4.95	5.46	0.195	0.215
c	0.46	0.61	0.018	0.024
c2	0.46	0.89	0.018	0.035
D	5.33	6.22	0.210	0.245
D1	4.57	6.00	0.180	0.236
E	6.35	6.73	0.250	0.265
E1	3.81	6.00	0.150	0.236
e	2.29 BSC		0.090 BSC	
H	9.40	10.41	0.370	0.410
L	0.90	1.78	0.035	0.070
L3	0.89	2.03	0.035	0.080
L4		1.02		0.040
θ	0°	8°	0°	8°

RECOMMENDED LAND PATTERN



UNIT: mm