TMP2070DF

P -Channel Enhancement Mosfet

General Description

- Low $R_{DS(ON)}$
- RoHS and Halogen-Free Compliant

Applications

- Load switch
- PWM

General Features

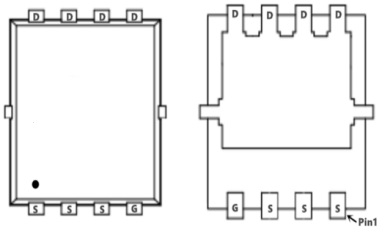
V_{DS} =- 20V I_D =-60A

$R_{DS(ON)}$ = 6.6 mΩ(typ.) @ V_{GS} =-4.5V

100% UIS Tested

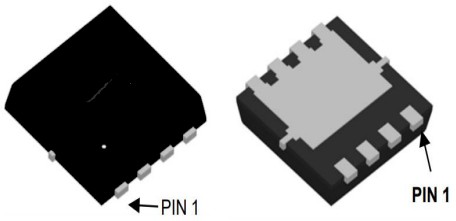
100% R_g Tested

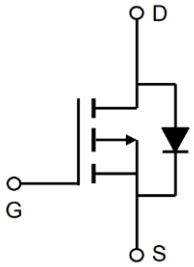
Green Product



Marking 70P02

DF:DFN3x3_8L





Absolute Maximum Ratings (T_C=25℃unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	±12	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-60	A
I_D@T_C=70℃	Continuous Drain Current, V_{GS} @ -4.5V[1]	-38	A
I_{DM}	Pulsed Drain Current[2]	-220	A
P_D@T_C=25℃	Total Power Dissipation[3]	42	W
T_{STG}	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction Ambient [1]	75	℃/W

Electrical Characteristics (T_J=25℃ 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	-20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = -20V, V_{GS} = 0V,	-	-	-1	μA
I_{GSS}	Gate to Body Leakage Current	V_{DS} =0V, V_{GS} = ±12V	-	-	±100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D= -250μA	-0. 5	-1.0	-1.5	V
$R_{DS(on)}$	Static Drain-Source on-Resistance note3	V_{GS} =-4.5V, I_D =-15A	-	6.6	8.5	mΩ
		V_{GS} =-2.5V, I_D =-12A	-	8	12	
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} =-10V, V_{GS} =0V, f = 1.0MHz	-	4600	-	pF
C_{oss}	Output Capacitance		-	460	-	pF
C_{rss}	Reverse Transfer Capacitance		-	459	-	pF
Q_g	Total Gate Charge	V_{DS} =-10V, I_D =-15A, V_{GS} =-4.5V	-	56	-	nC
Q_{gs}	Gate-Source Charge		-	8	-	nC
Q_{gd}	Gate-Drain(“Miller”) Charge		-	16	-	nC
Switching Characteristics						
$t_{d(on)}$	Turn-on Delay Time	V_{DD} =-10V, I_D =-13A, R_{GEN}=2.7Ω,V_{GS} =-10V	-	11	-	ns
t_r	Turn-on Rise Time		-	110	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	157	-	ns
t_f	Turn-off Fall Time		-	160	-	ns
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain to Source Diode Forward Current		-	-	-60	A
I_{SM}	Maximum Pulsed Drain to Source Diode Forward Current		-	-	-220	A
V_{SD}	Drain to Source Diode Forward Voltage	V_{GS} = 0V, I_S =-30A	-	-	-1.2	V
trr	Reverse Recovery Time	T_J=25℃,I_{SD}=-15A, V_{GS}=0V di/dt=-100A/μs	-	23	-	ns
Qrr	Reverse Recovery Charge		-	14	-	Nc

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

2. EAS condition: T_J=25℃,V_{DD}=-10V,V_G=-10V, R_G=5.9Ω, L=0.5mh,I_{AS}=-16A

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤0.5%

Typical Performance Characteristics

Figure1: Output Characteristics

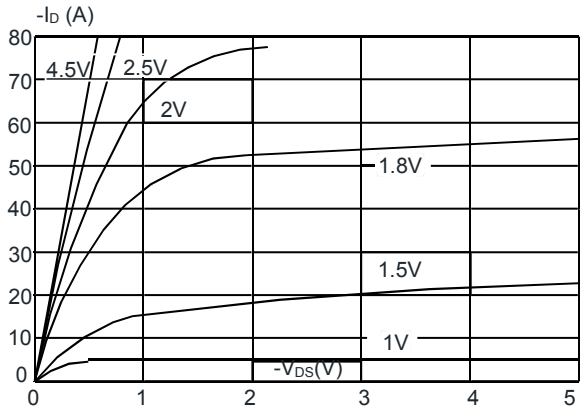


Figure 2: Typical Transfer Characteristics

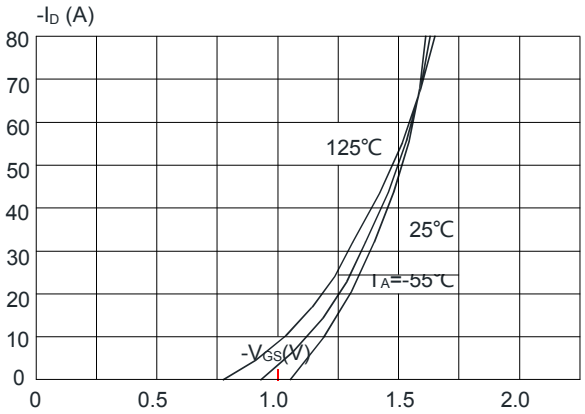


Figure 3: On-resistance vs. Drain Current

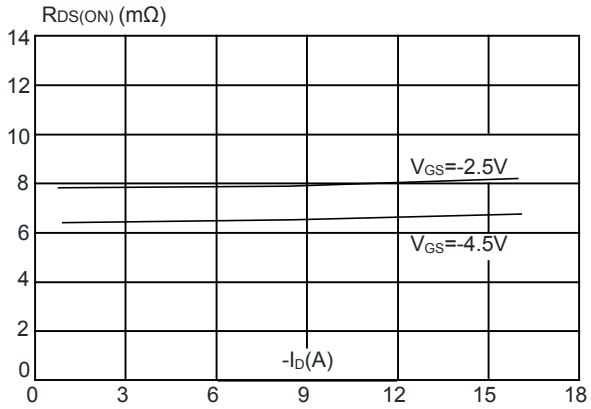


Figure 4: Body Diode Characteristics

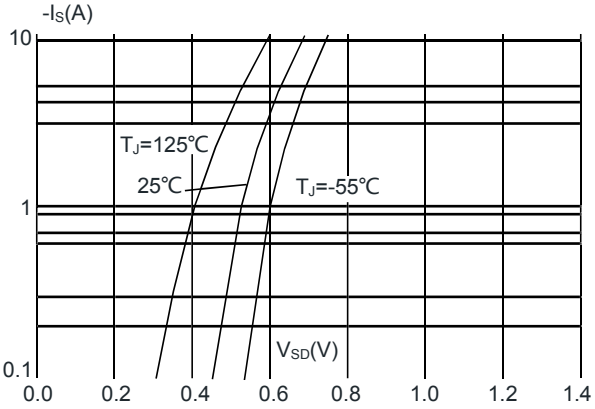


Figure 5: Gate Charge Characteristics

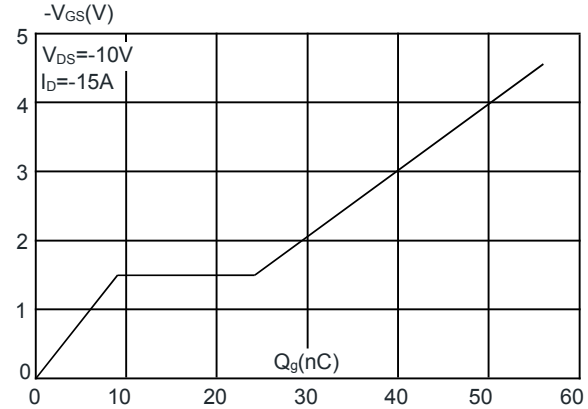


Figure 6: Capacitance Characteristics

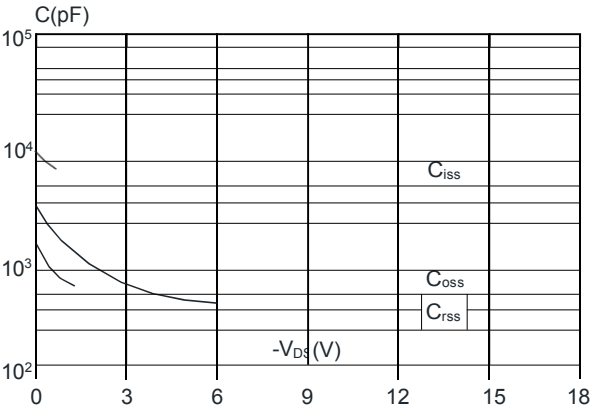


Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

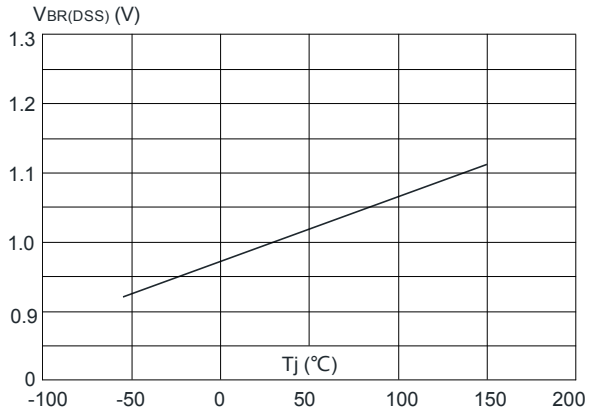


Figure 8: Normalized on Resistance vs. Junction Temperature

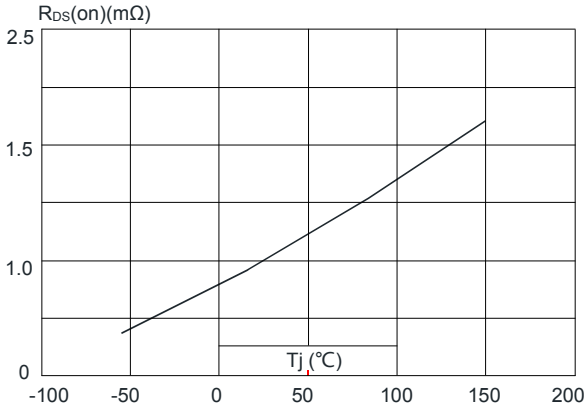


Figure 9: Maximum Safe Operating Area

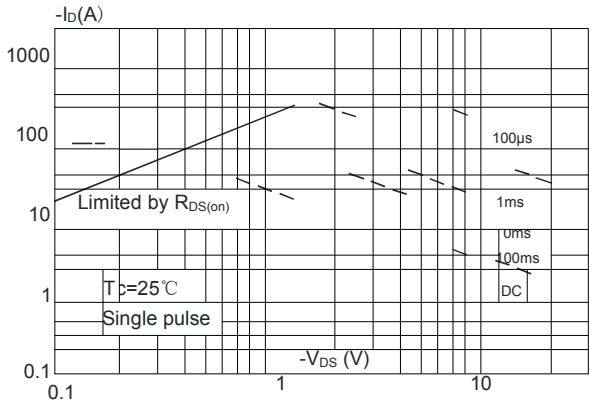


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

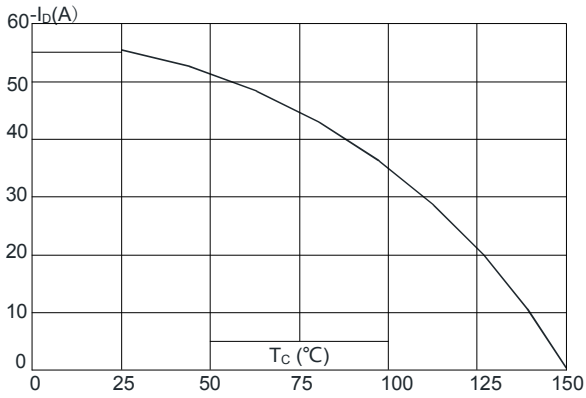
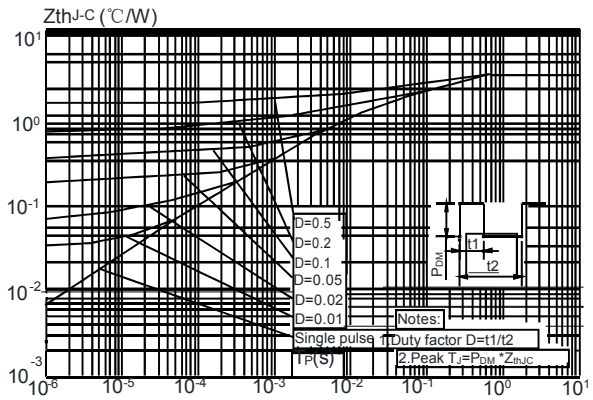
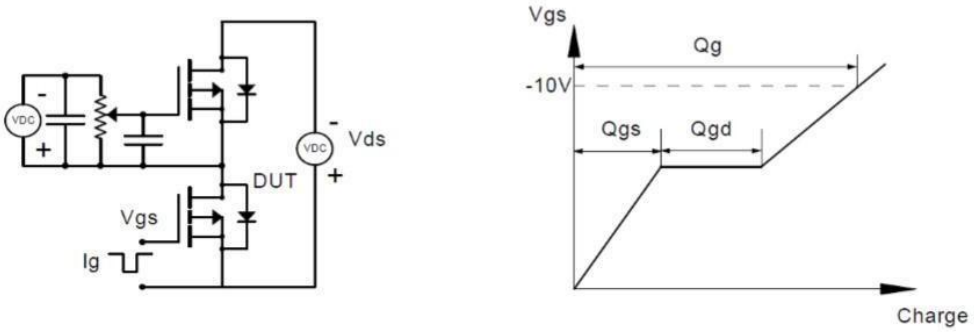


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

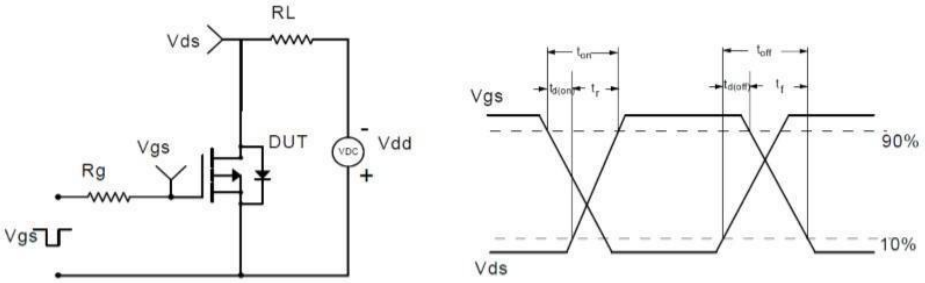


Test Circuit

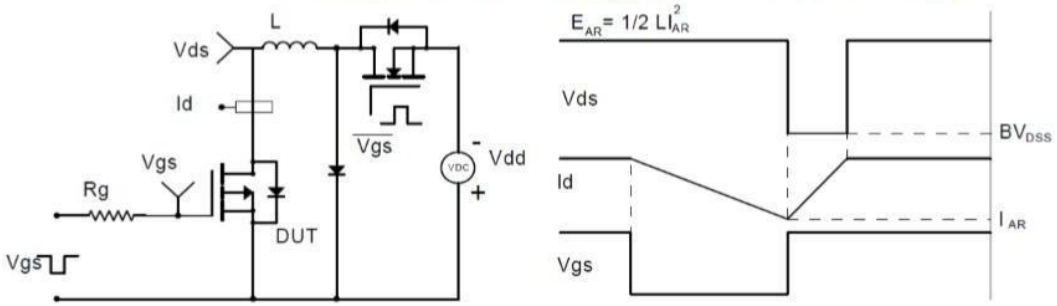
Gate Charge Test Circuit & Waveform



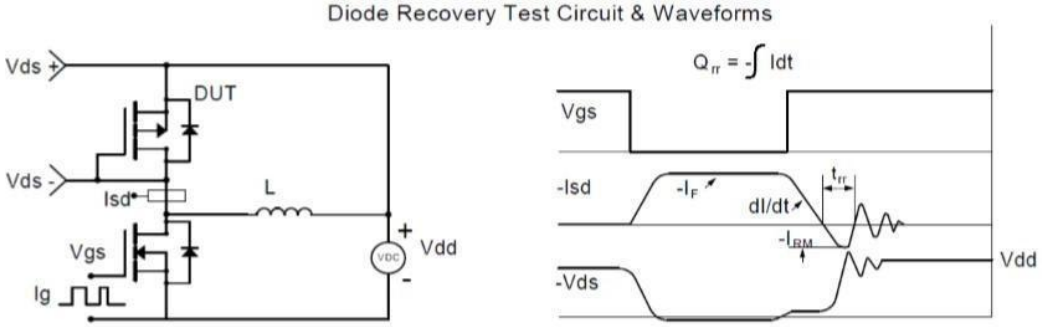
Resistive Switching Test Circuit & Waveforms



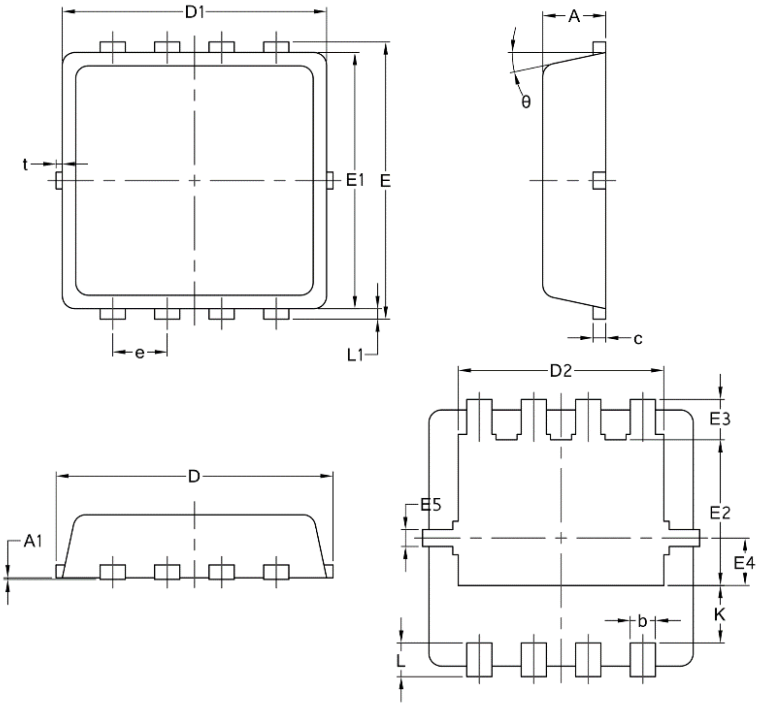
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Mechanical Data:DFN3x3-8L



Symbol	Common		
	mm		
	Mim	Nom	Max
A	0.70	0.75	0.85
A1	/	/	0.05
b	0.20	0.30	0.40
c	0.10	0.152	0.25
D	3.15	3.30	3.45
D1	3.00	3.15	3.25
D2	2.29	2.45	2.65
E	3.15	3.30	3.45
E1	2.90	3.05	3.20
E2	1.54	1.74	1.94
E3	0.28	0.48	0.65
E4	0.37	0.57	0.77
E5	0.10	0.20	0.30
e	0.60	0.65	0.70
K	0.59	0.69	0.89
L	0.30	0.40	0.50
L1	0.06	0.125	0.20
t	0	0.075	0.13
Φ	10	12	14