


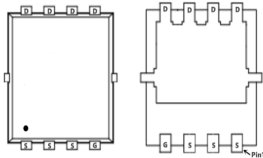
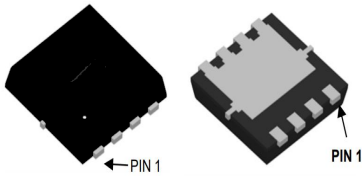
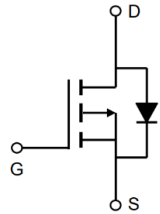


TM60P03DF

P -Channel Enhancement Mosfet

<p>General Description</p> <ul style="list-style-type: none"> • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant <p>Applications</p> <ul style="list-style-type: none"> • Load switch • PWM 	<p>General Features</p> <p>$V_{DS} = -30V$ $I_D = -60A$ $R_{DS(ON)} = 7.5m\Omega$(typ.) @ $V_{GS} = -10V$</p> <p>100% UIS Tested 100% R_g Tested</p> 
--	--

DF:DFN3x3_8L

Marking:60P03

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current	I_D	$T_C = 25^\circ C$	-60
		$T_C = 100^\circ C$	-35
Pulsed Drain Current ¹	I_{DM}	-168	A
Single Pulse Avalanche Energy ²	EAS	45	mJ
Total Power Dissipation	$T_C = 25^\circ C$	P_D	37
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	$R_{\theta JA}$	75	$^\circ C/W$
Thermal Resistance from Junction-to-Case	$R_{\theta JC}$	3.36	$^\circ C/W$



TM60P03DF

P -Channel Enhancement Mosfet

Electrical Characteristics (T_J = 25°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	-30	-	-	V	
Gate-body Leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} = ±20V	-	-	±100	nA	
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V	T _J =25°C	-	-	-1	μA
			T _J =100°C	-	-	-100	
Gate-Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-1.5	-2.5	V	
Drain-Source On-Resistance ⁴	R _{DS(on)}	V _{GS} = -10V, I _D = -30A	-	7.5	9.9	mΩ	
		V _{GS} = -4.5V, I _D = -15A	-	10	18		
Forward Transconductance ⁴	g _{fs}	V _{DS} = -5V, I _D = -30A	-	57	-	S	
Dynamic Characteristics⁵							
Input Capacitance	C _{iss}	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz	-	2096	-	pF	
Output Capacitance	C _{oss}		-	325	-		
Reverse Transfer Capacitance	C _{rss}		-	283	-		
Gate Resistance	R _g	f = 1MHz	-	10.5	-	Ω	
Switching Characteristics⁵							
Total Gate Charge	Q _g	V _{GS} = -10V, V _{DS} = -15V, I _D = -30A	-	30	-	nC	
Gate-Source Charge	Q _{gs}		-	5	-		
Gate-Drain Charge	Q _{gd}		-	7.5	-		
Turn-On Delay Time	t _{d(on)}	V _{GS} = -10V, V _{DD} = -15V, R _G = 3Ω, I _D = -30A	-	14.1	-	ns	
Rise Time	t _r		-	20	-		
Turn-Off Delay Time	t _{d(off)}		-	94	-		
Fall Time	t _f		-	65	-		
Body Diode Reverse Recovery Time	t _{rr}	I _F = -30A, di/dt = 100A/μs	-	19	-	ns	
Body Diode Reverse Recovery Charge	Q _{rr}		-	9	-	nC	
Drain-Source Body Diode Characteristics							
Diode Forward Voltage ⁴	V _{SD}	I _S = -1A, V _{GS} = 0V	-	-	-1.2	V	
Continuous Source Current	I _S	T _C =25°C	-	-	-60	A	

Note :

1. Repetitive rating, pulse width limited by junction temperature T_{J(MAX)}=150°C.
2. The EAS data shows Max. rating . The test condition is V_{DD}= -25V, V_{GS}= -10V, L= 0.1mH, I_{AS}= -30A.
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 ≤ 300us , duty cycle ≤ 2%.
5. This value is guaranteed by design hence it is not included in the production test.

Typical Characteristics

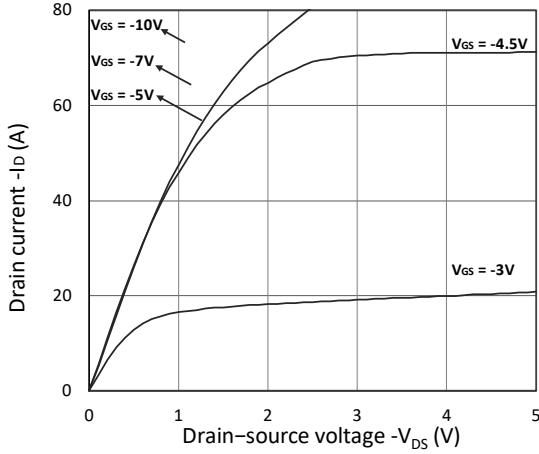


Figure 1. Output Characteristics

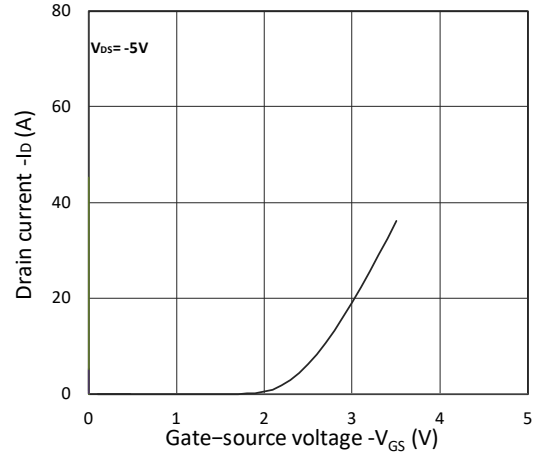


Figure 2. Transfer Characteristics

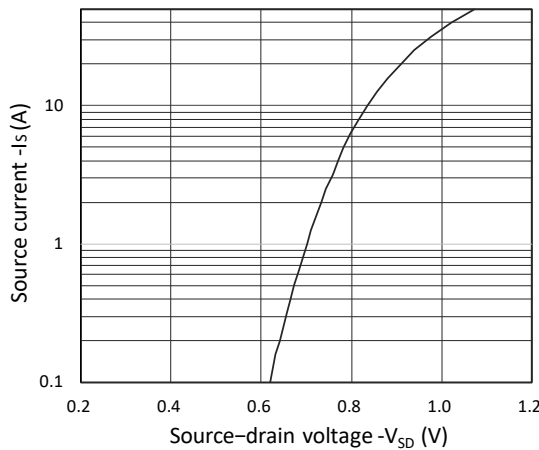


Figure 3. Forward Characteristics of Reverse

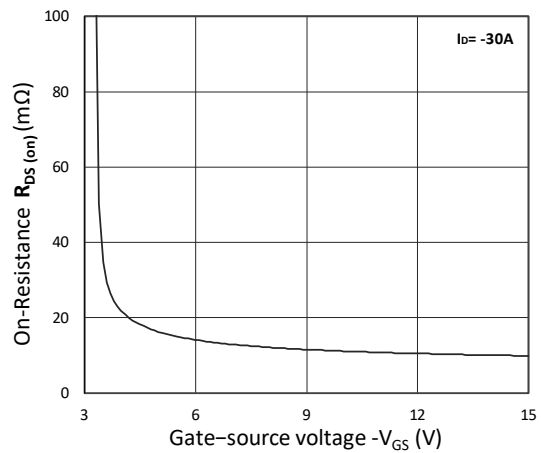


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

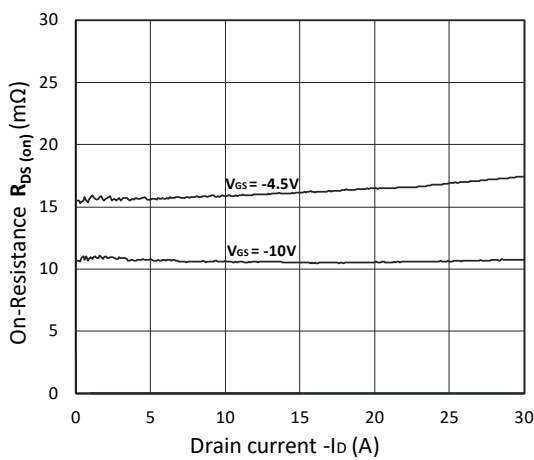


Figure 5. $R_{DS(ON)}$ vs. I_D

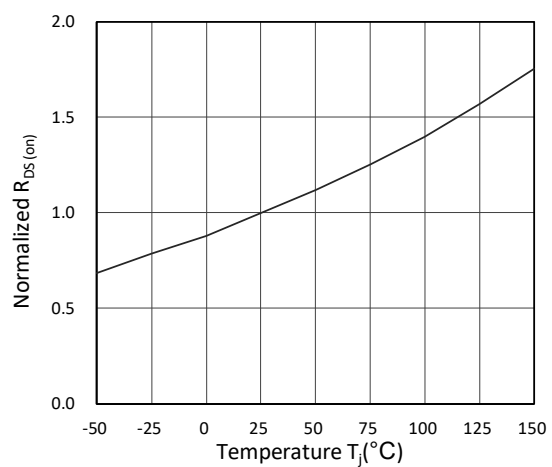


Figure 6. Normalized $R_{DS(ON)}$ vs. Temperature



TM60P03DF

P -Channel Enhancement Mosfet

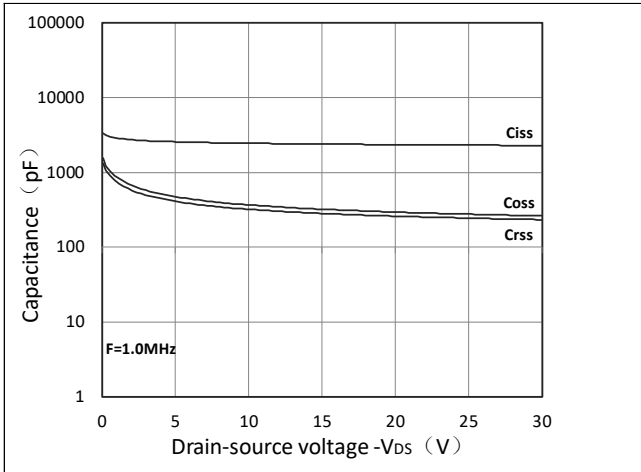


Figure 7. Capacitance Characteristics

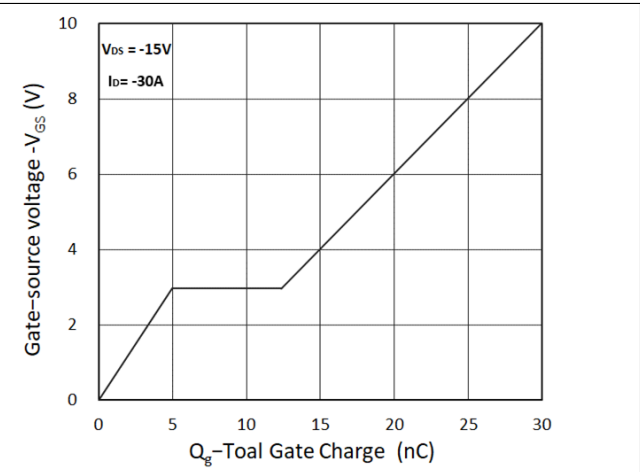


Figure 8. Gate Charge Characteristics

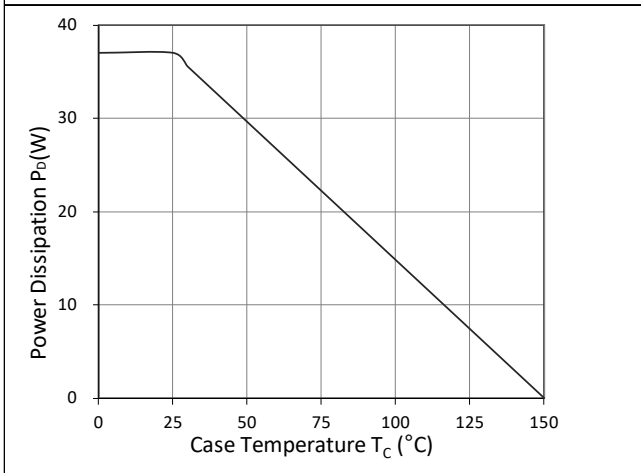


Figure 9. Power Dissipation

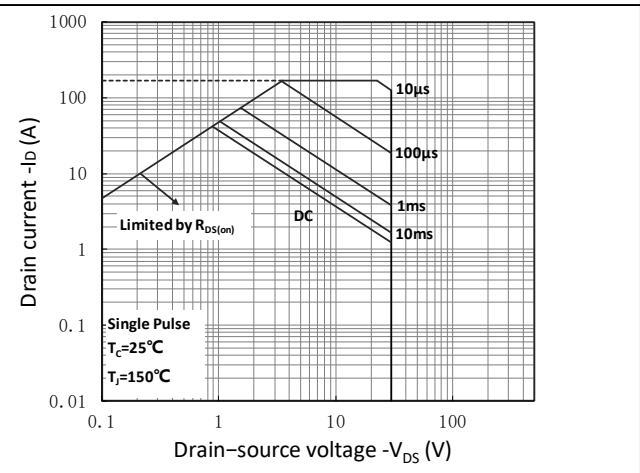


Figure 10. Safe Operating Area

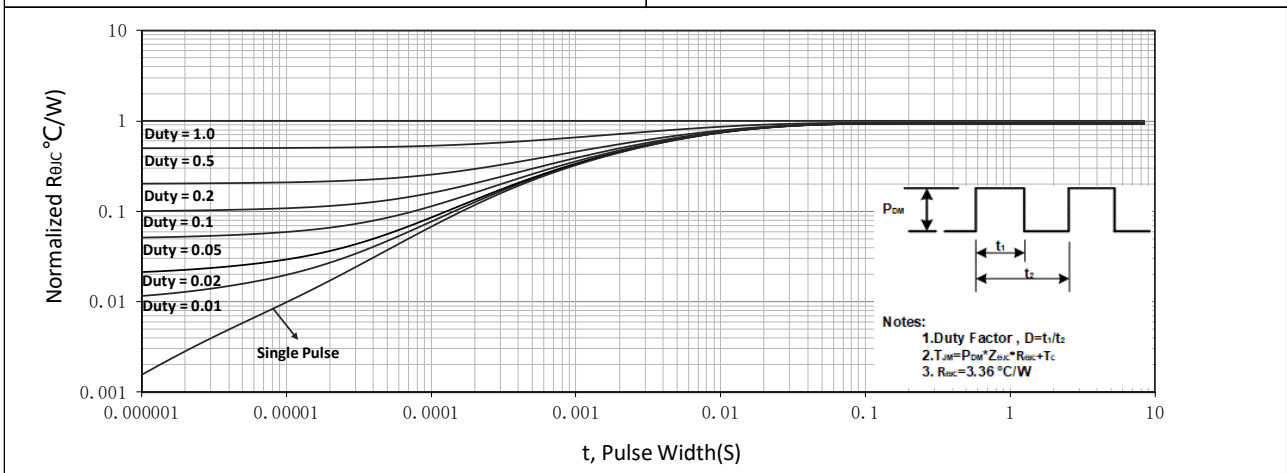


Figure 11. Normalized Maximum Transient Thermal Impedance

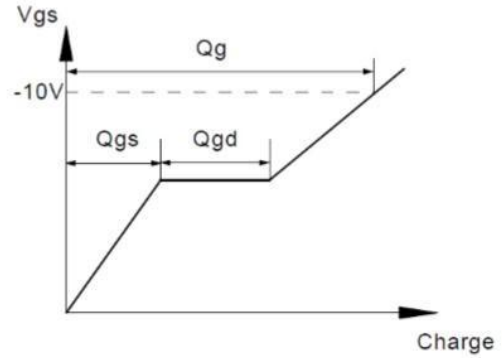
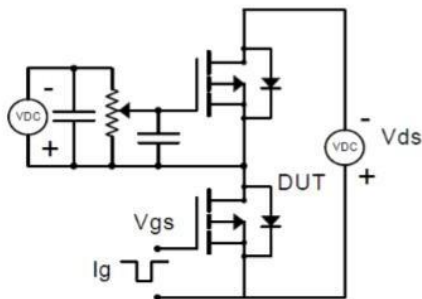


TM60P03DF

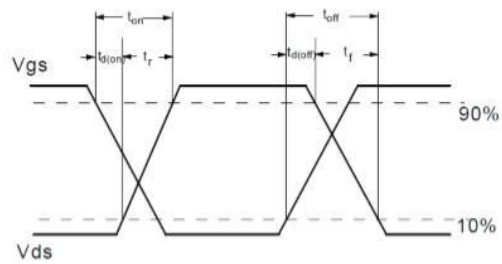
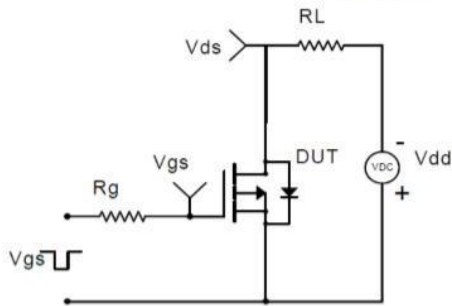
P -Channel Enhancement Mosfet

Test Circuit

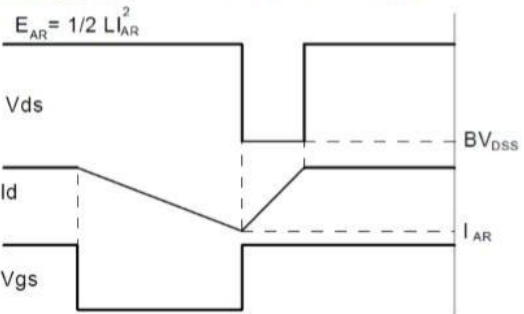
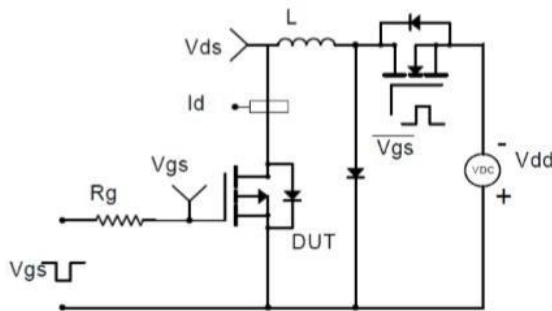
Gate Charge Test Circuit & Waveform



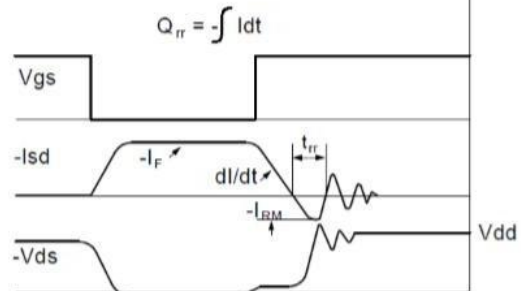
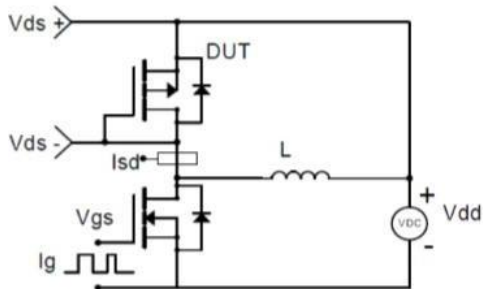
Resistive Switching Test Circuit & Waveforms



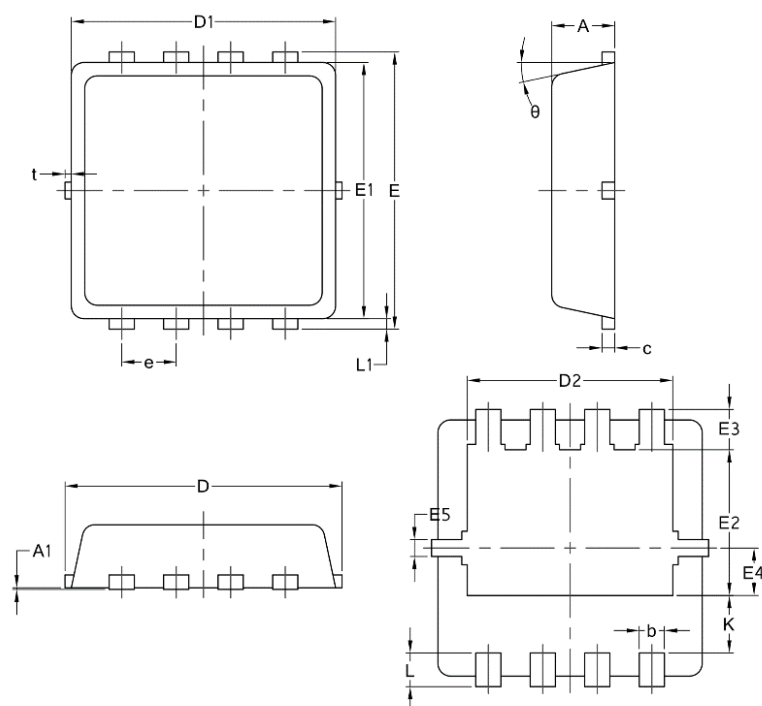
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



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