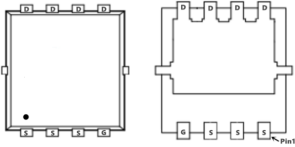
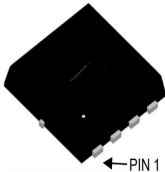
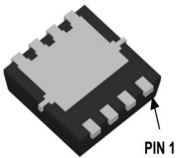
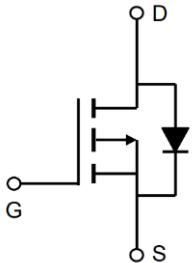


General Description • Low $R_{DS(ON)}$ • RoHS and Halogen-Free Compliant Applications • Load switch • PWM		General Features $V_{DS} = -20V$ $I_D = -60A$ $R_{DS(ON)} = 6.6\ m\Omega (typ.) @ V_{GS} = -4.5V$	
		100% UIS Tested 100% R_g Tested	
DF:DFN3x3-8L     Marking: 60P02			
Absolute Maximum Ratings ($T_C = 25^\circ C$ unless otherwise noted)			
Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-60	A
$I_D @ T_C = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-38	A
I_{DM}	Pulsed Drain Current ²	-220	A
$P_D @ T_C = 25^\circ C$	Total Power Dissipation ³	42	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
Thermal Data			
Symbol	Parameter	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction Ambient ¹	75	$^\circ C/W$

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	-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	8.0	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: $T_J = 25^{\circ}\text{C}, V_{DD} = -10V, V_G = -10V, R_G = 5.9\Omega, L = 0.5mh, I_{AS} = -16A$
 3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 0.5\%$

Typical Performance Characteristics

Figure 1: Output Characteristics

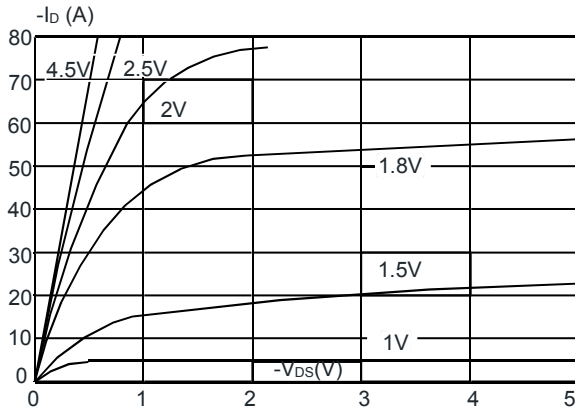


Figure 2: Typical Transfer Characteristics

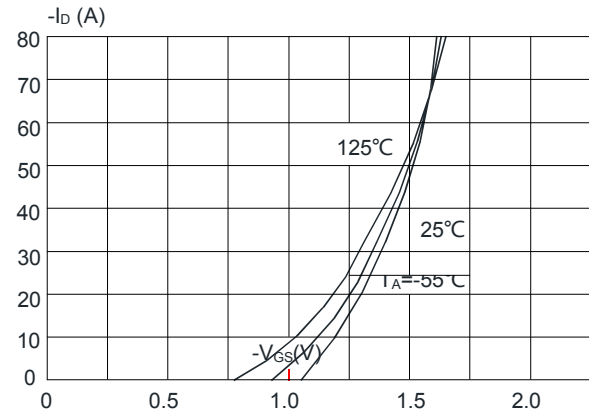


Figure 3: On-resistance vs. Drain Current

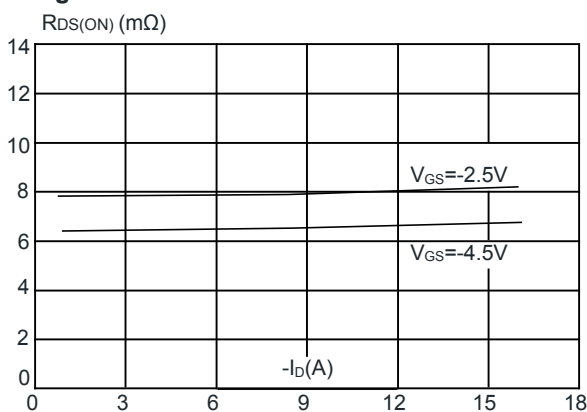


Figure 4: Body Diode Characteristics

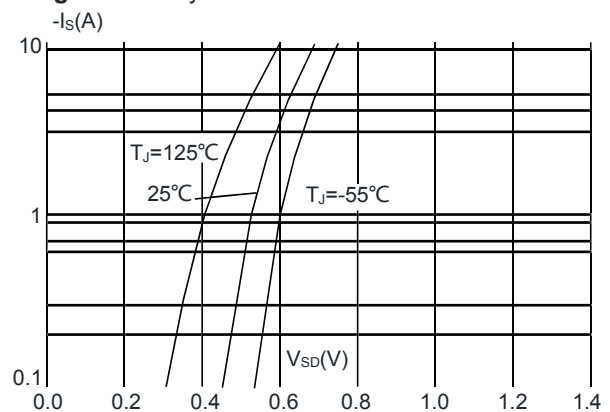


Figure 5: Gate Charge Characteristics

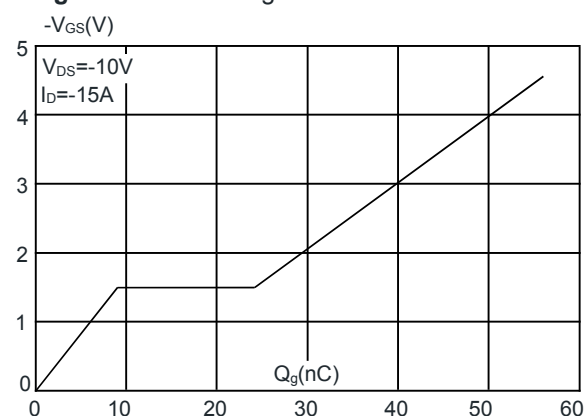
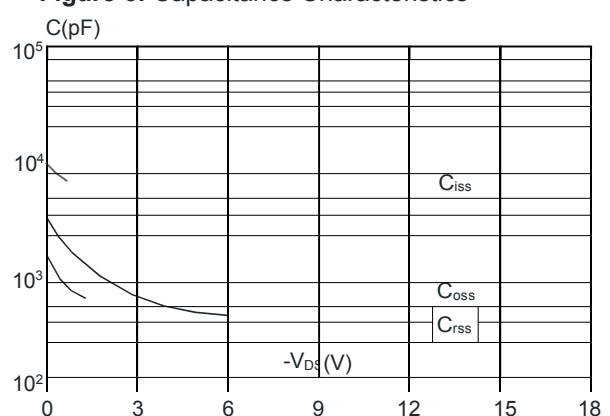


Figure 6: Capacitance Characteristics



TM60P02DF

P -Channel Enhancement Mosfet

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

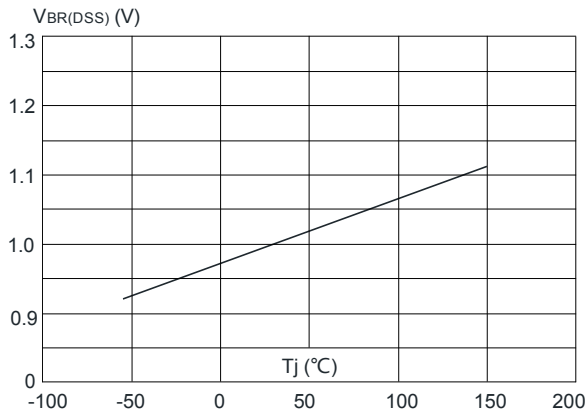


Figure 8: Normalized on Resistance vs. Junction Temperature

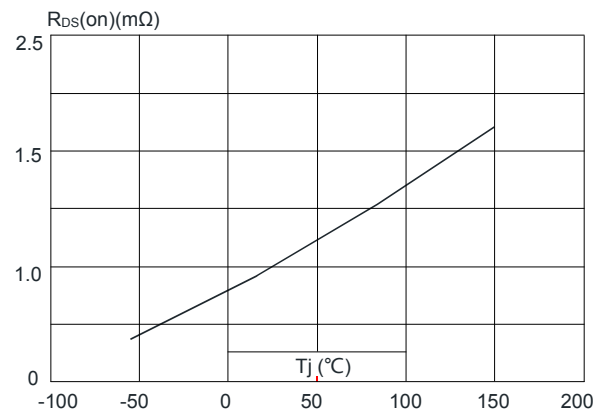


Figure 9: Maximum Safe Operating Area

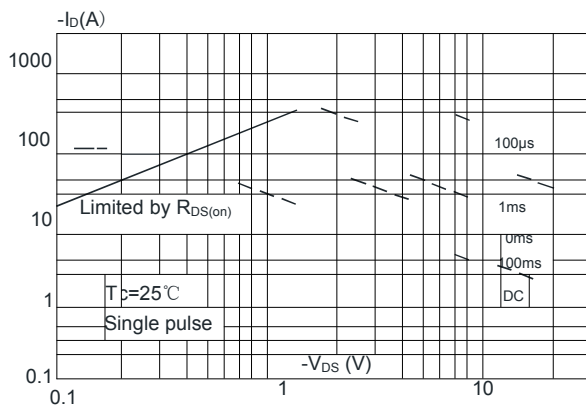


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

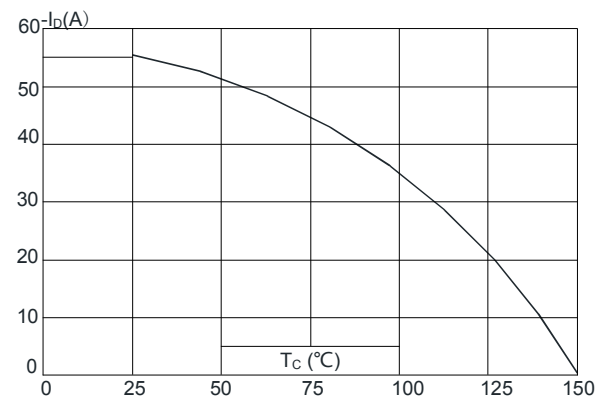
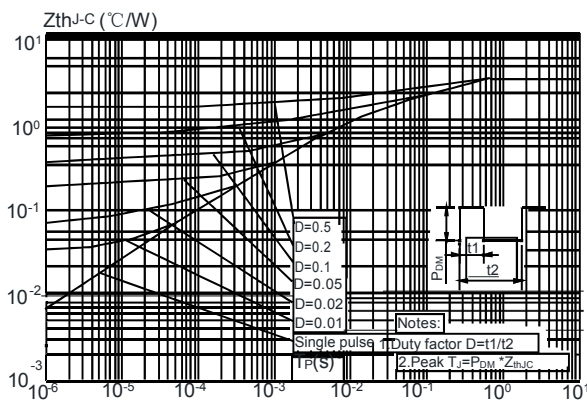
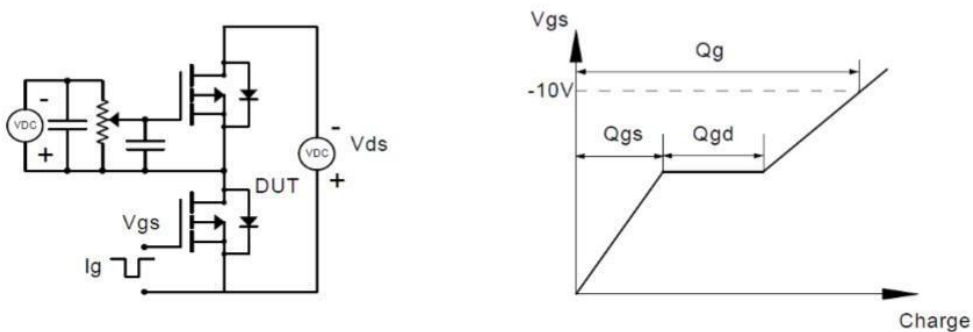


Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case

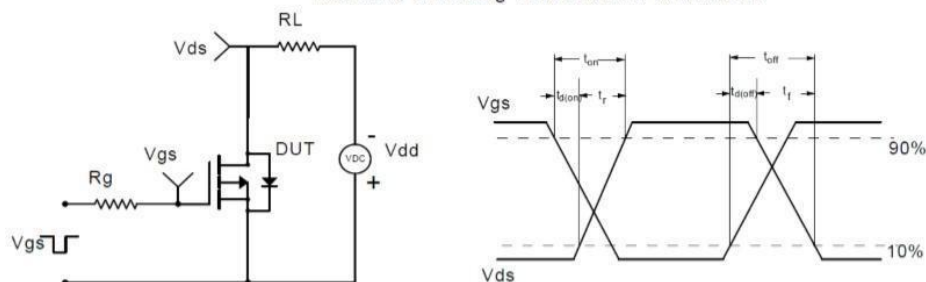


Test Circuit

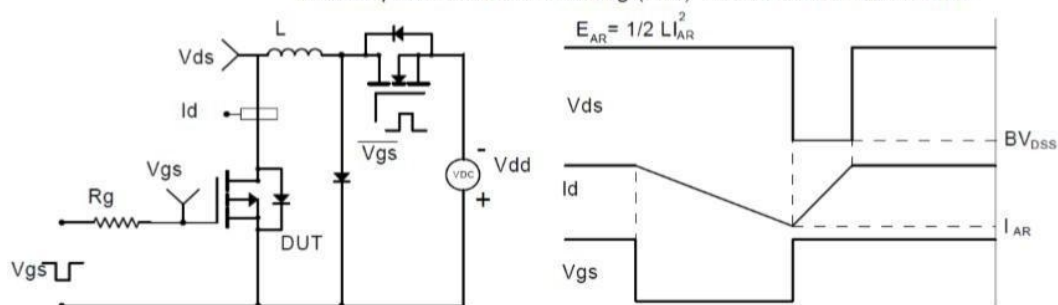
Gate Charge Test Circuit & Waveform



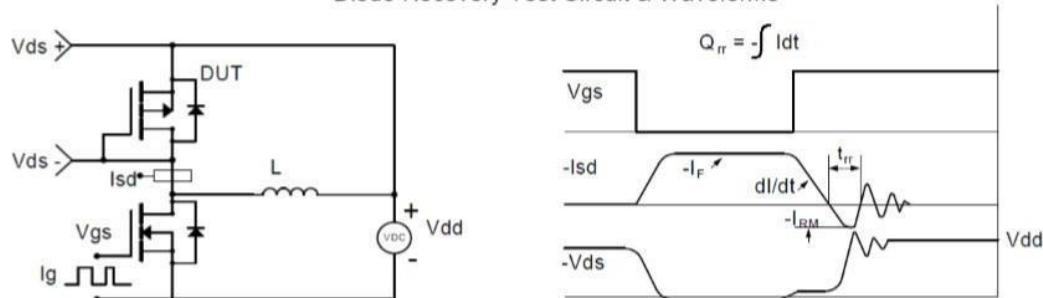
Resistive Switching Test Circuit & Waveforms



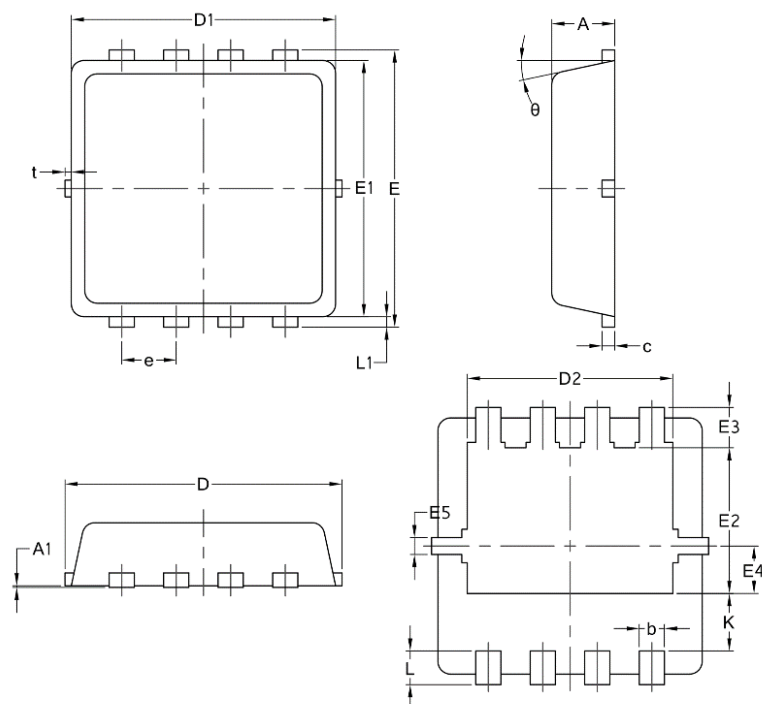
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



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