Wuxi Unigroup Microelectronics CO.,LTD.

30V N-Channel Trench MOSFET(Preliminary)

General Description

- Trench Power technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- High Current Capability

Applications

- Synchronous Rectification in DC/DC and AC/DC Converters
- Isolated DC/DC Converters in Telecom and Industrial

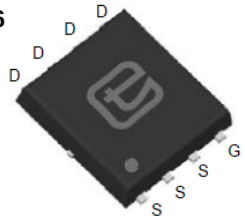
Product Summary

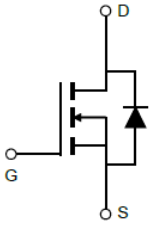
V_{DS}	30V
I_D (at V_{GS}=10V)	160A
$R_{DS(ON)}$ (at V_{GS}=10V)	< 1.8mΩ
$R_{DS(ON)}$ (at V_{GS}=4.5V)	< 2.5mΩ

100% UIS Tested

RoHS

DFN5x6





Part Number	Package Type	Form	Marking
TTG160N03AT	DFN5x6	Tape&Reel	160N03AT

Absolute Maximum Ratings (T_A =25°C unless otherwise noted)

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [A]	T_C =25°C	I_D	160	A
	T_C =100°C		110	
Pulsed Drain Current [A]		I_{DM}	480	A
Avalanche Current [A]		I_{AS}	56	A
Single Pulse Avalanche Energy L =0.3mH [A]		E_{AS}	470	mJ
Power Dissipation [C]	T_C =25°C	P_D	136	W
	T_C =100°C		68	W
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C

Thermal Characteristics

Parameter		Symbol	Maximum	Units
Maximum Junction-to-Case	Steady-State	$R_{\theta JC}$	1.1	°C/W
Maximum Junction-to-Ambient	Steady-State	$R_{\theta JA}$	100	

Electrical Characteristics(T_J =25ºC unless otherwise noted)

Symbol	Parameter	Conditions		Value			Units
				Min	Typ	Max	
STATIC PARAMETERS							
BV_{DSS}	Drain-Source Breakdown Voltage	I_D =250μA,V_{GS} =0V		30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =30V, V_{GS} =0V	T_J =25ºC			1	μA
			T_J =125ºC			100	
I_{GSS}	Gate-Body Leakage Current	V_{DS} =0V, V_{GS} =±20V				±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} =V_{GS}, I_D =250μA		1	1.6	2.4	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS} =10V, I_D =30A			1.3	1.8	mΩ
		V_{GS} =4.5V, I_D =30A			2.0	2.5	mΩ
g_{FS}	Forward Transconductance	V_{DS} =10V, I_D =20A			61		S
V_{SD}	Diode Forward Voltage	I_S =30A, V_{GS} =0V				1	V
I_S	Maximum Body-Diode Continuous Current [B]					51	A
DYNAMIC PARAMETERS							
C_{iss}	Input Capacitance	V_{GS} =0V, V_{DS} =15V, f =1MH_Z			8826		pF
C_{oss}	Output Capacitance				1320		
C_{rss}	Reverse Transfer Capacitance				1386		
R_g	Gate Resistance	f =1MH_Z			1.7		Ω
SWITCHING PARAMETERS							
Q_g	Total Gate Charge	V_{GS} =10V,V_{DS} =15V, I_D =50A			177		nC
Q_{gs}	Gate Source Charge				29		
Q_{gd}	Gate Drain Charge				35		
$t_{D(on)}$	Turn-On Delay Time	V_{GS} =10V,V_{DS} =15V, I_D =50A, R_G =3Ω			30		ns
t_r	Turn-On Rise Time				29		
$T_{D(off)}$	Turn-Off Delay Time				101		
t_f	Turn-Off Fall Time				48		
t_{rr}	Body Diode Reverse Recovery Time	I_F =30A, di/dt =100A/μs			47		ns
Q_{rr}	Body Diode Reverse Recovery Charge				43		nC

A. Single pulse width limited by maximum junction temperature.

B. The maximum current rating is package limited.

C. The power dissipation P_D is based on $T_{J(MAX)}$ =175ºC, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

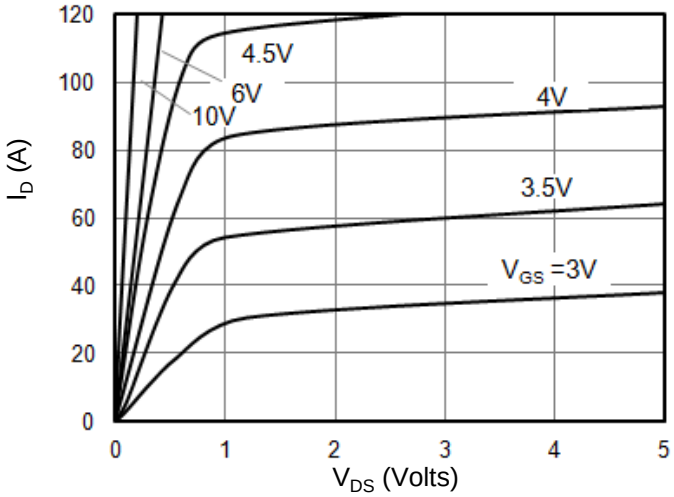


Figure 1: On-Region Characteristics

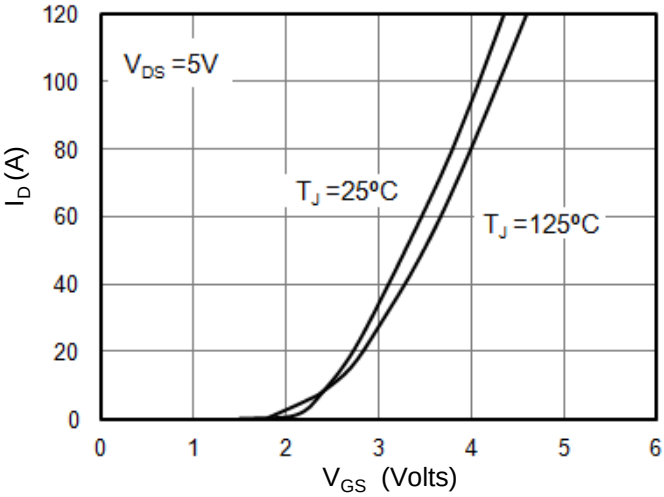


Figure 2: Transfer Characteristics

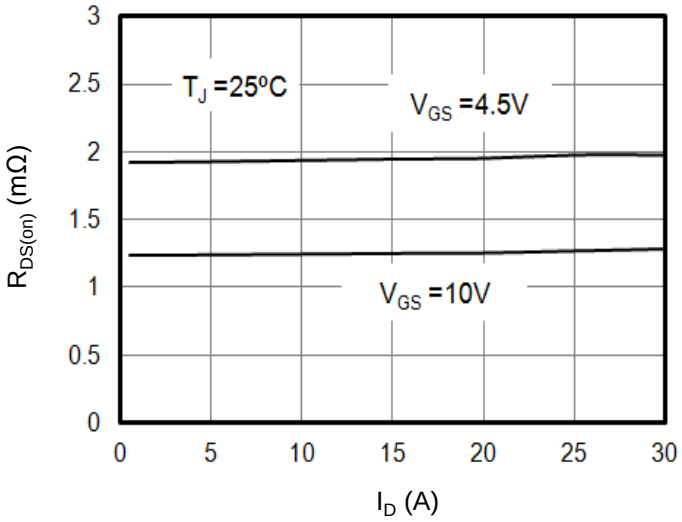


Figure 3: On-Resistance vs. Drain Current

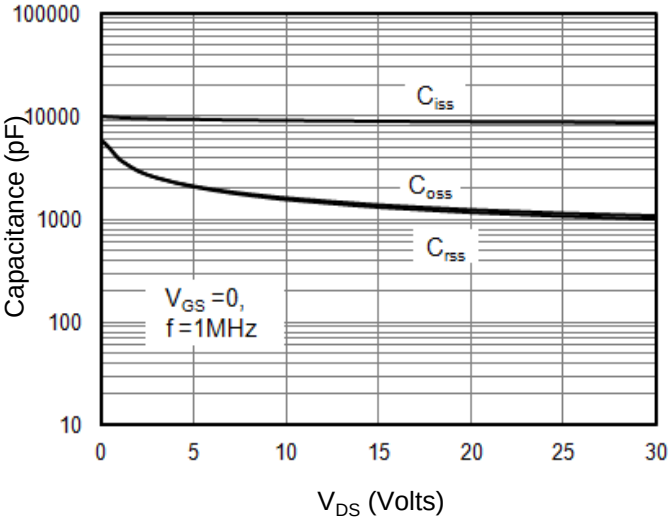


Figure 4: Capacitance Characteristics

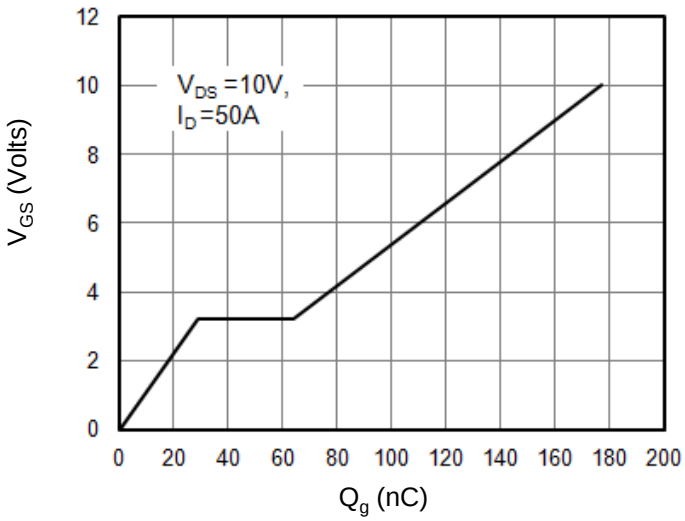


Figure 5: Gate Charge Characteristics

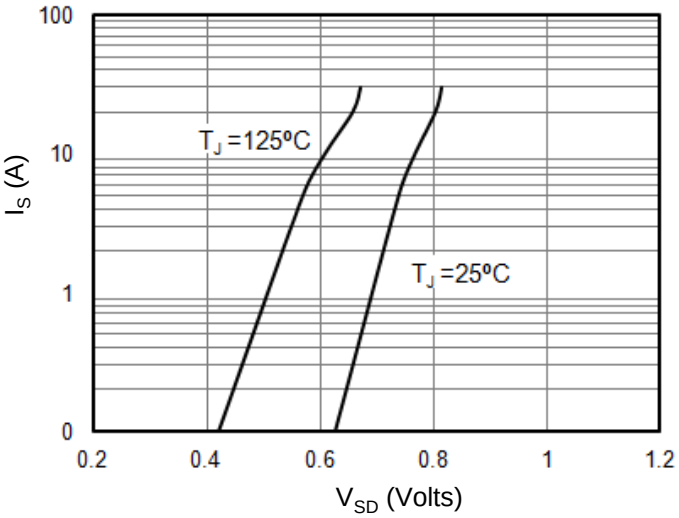


Figure 6: Body Diode Forward Voltage

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

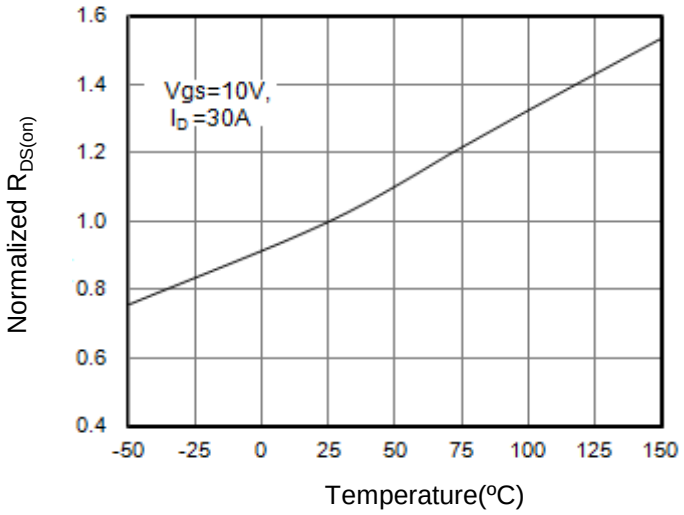


Figure 7: On-Resistance vs. Junction Temperature

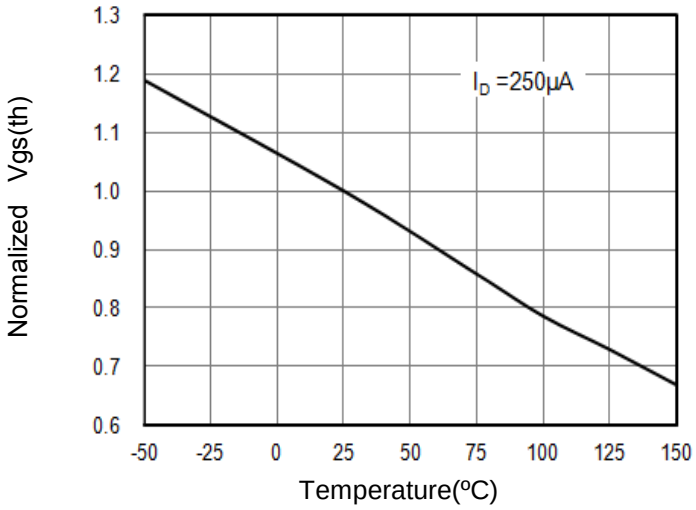


Figure 8: Vgs(th) vs. Junction Temperature

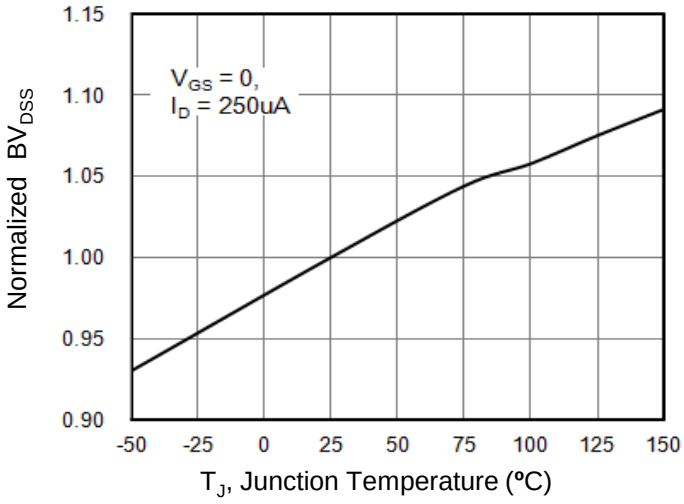


Figure 9: BV_{DSS} vs. Junction Temperature

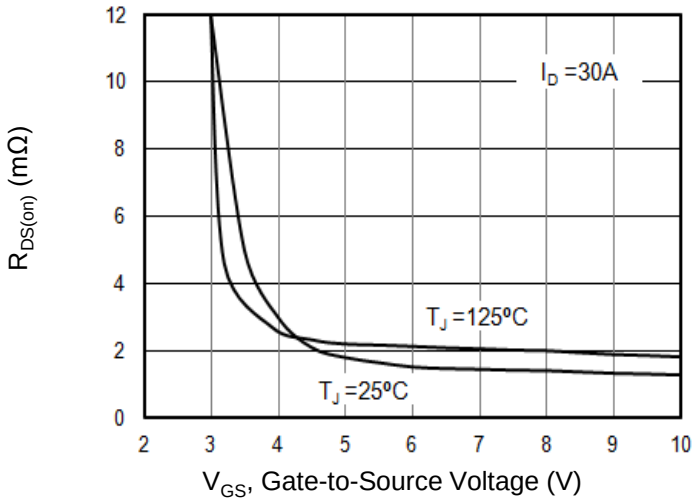


Figure 10: On-Resistance vs. Gate-Source Voltage

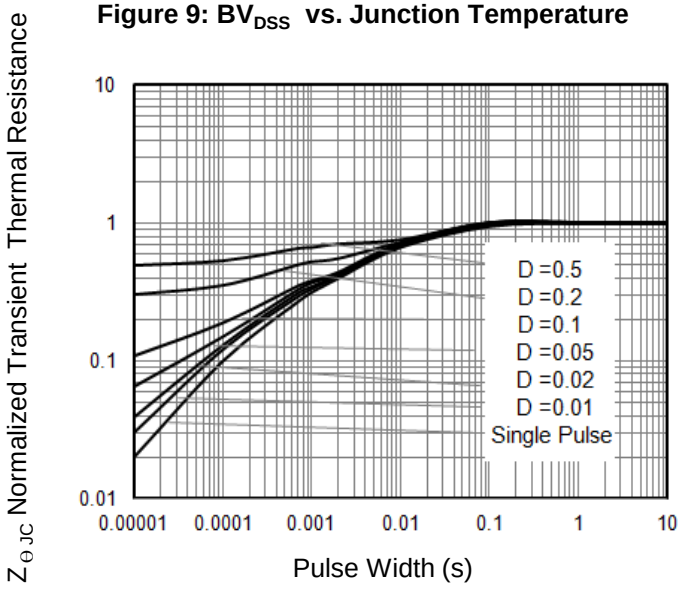


Figure 11: Normalized Transient Thermal Resistance

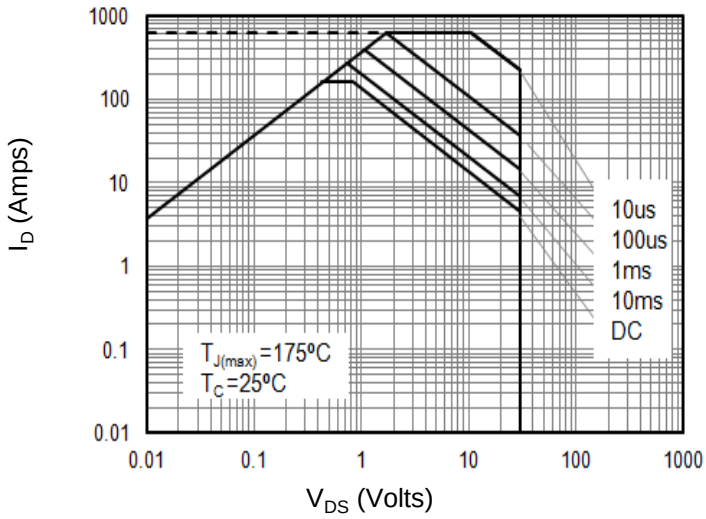


Figure 12: Safe Operating Area

Figure A：Gate Charge Test Circuit and Waveforms

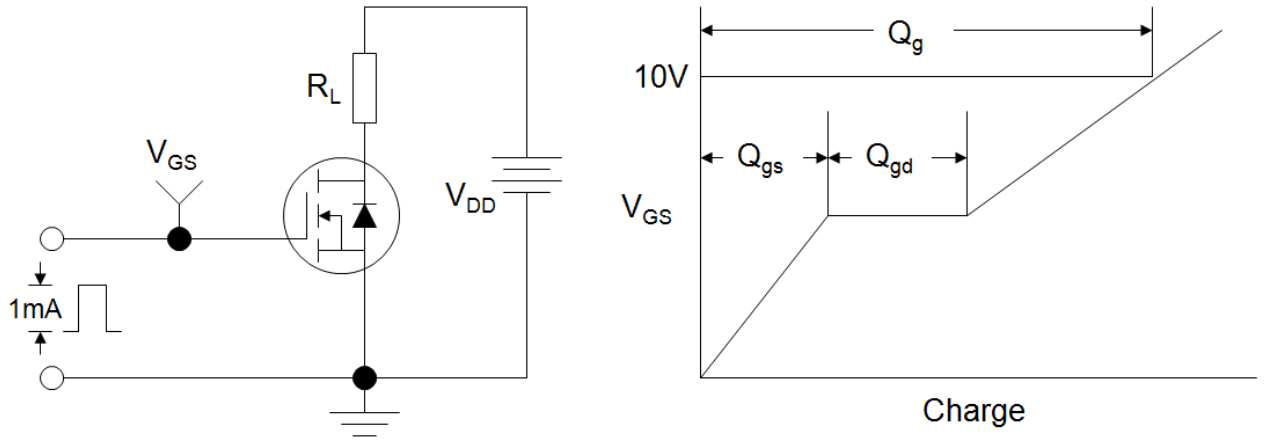


Figure B：Resistive Switching Test Circuit and Waveforms

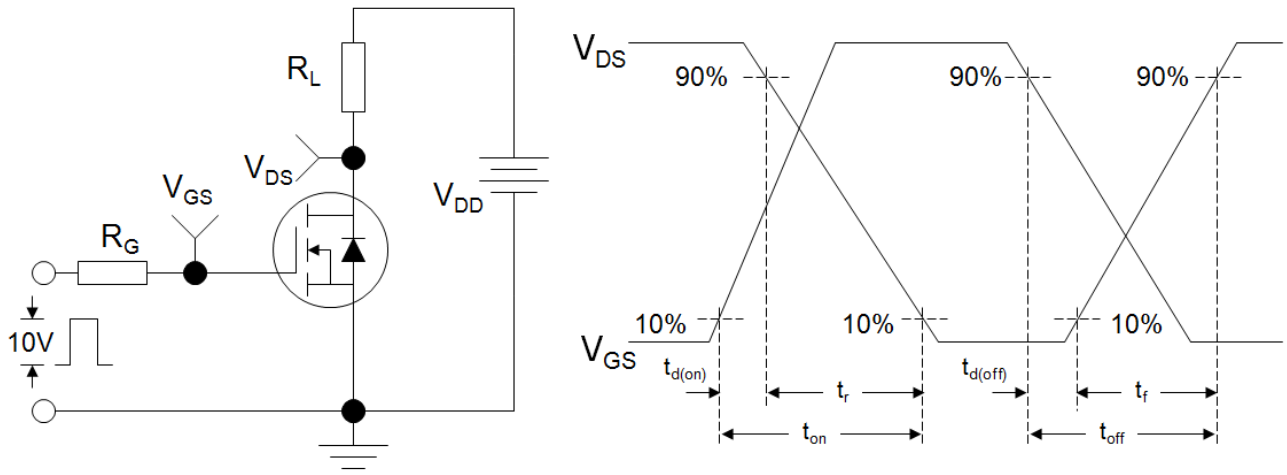
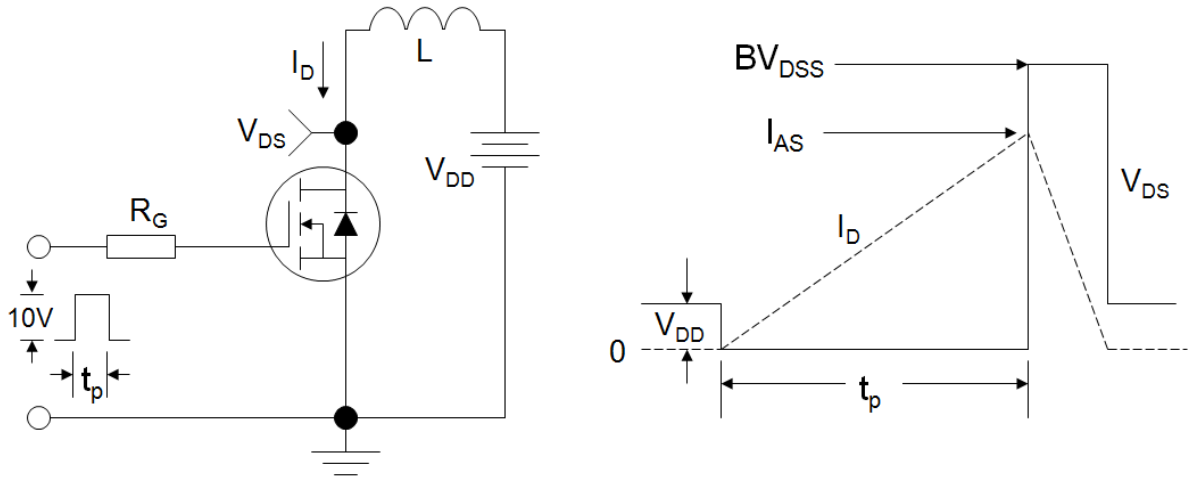
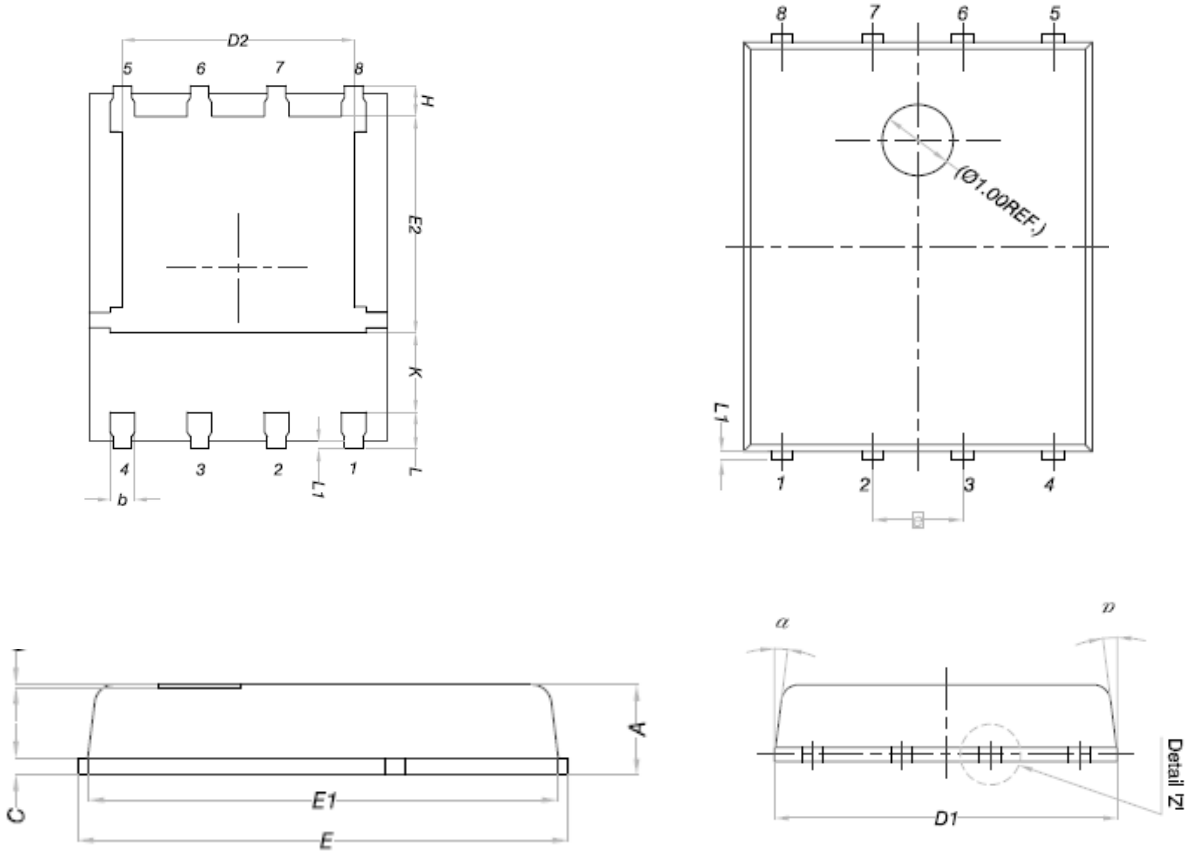


Figure C：Unclamped Inductive Switching (UIS) Test Circuit and Waveforms



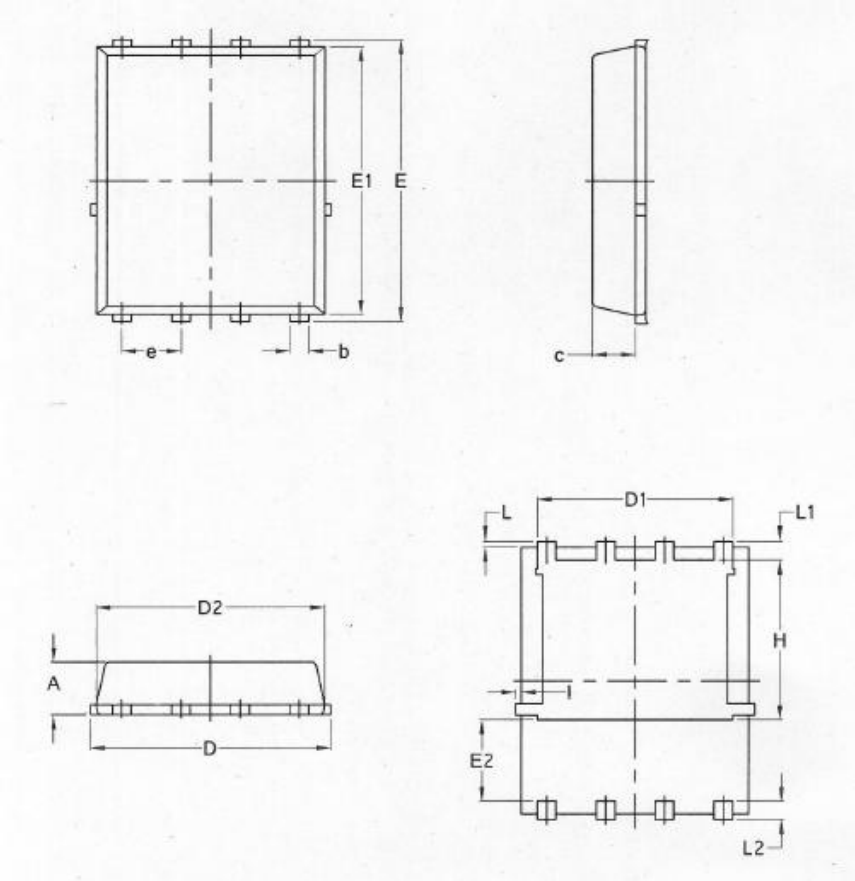
DFN5x6(M)



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.00	1.10
A1	0	-	0.05
b	0.33	0.41	0.51
C	0.20	0.25	0.30
D1	4.80	4.90	5.00
D2	3.61	3.81	3.96

DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
E	5.90	6.00	6.10
E1	5.70	5.75	5.80
E2	3.38	3.58	3.78
e	1.27 BSC		
H	0.41	0.51	0.61
K	1.10	-	-
L	0.51	0.61	0.71
L1	0.06	0.13	0.20
α	0°	-	12°

DFN5x6(V)



	SYMBOL	COMMON			
		MM		INCH	
		MIN.	MAX.	MIN.	MAX.
	A	1.03	1.17	0.0406	0.0461
	b	0.34	0.48	0.0134	0.0189
	c	0.824	0.970	0.0324	0.0382
3	D	4.80	5.40	0.1890	0.2126
	D1	4.11	4.31	0.1618	0.1697
3	D2	4.80	5.00	0.1890	0.1969
	E	5.95	6.15	0.2343	0.2421
	E1	5.65	5.85	0.2224	0.2303
	E2	1.60	—	0.0630	—
	e	1.27 BSC		0.05 BSC	
3	L	0.05	0.25	0.0020	0.0098
	L1	0.38	0.50	0.0150	0.0197
	L2	0.38	0.50	0.0150	0.0197
4	H	3.30	3.50	0.1299	0.1378
	I	—	0.18	—	0.0070

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