

1.Description

This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

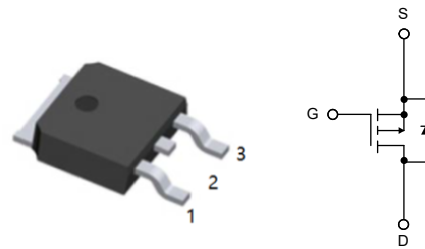
2.Features

- $V_{DS(V)} = -60V$
- $I_D = -12A$
- $R_{DS(ON)} < 135m\Omega (V_{GS} = -10V)$

3.Pinning information

Pin	Symbol	Description
1	G	GATE
3	S	SOURCE
2	D	DRAIN

TO-252(DPAK)
top view



4.Absolute Maximum Ratings $T_c = 25^\circ C$

Parameter	Symbol	Rating	Units
Drain - Source Voltage	V_{DSS}	-60	V
Drain Current - Continuous $T_c = 25^\circ C$	I_D	-12	A
- Continuous $T_c = 100^\circ C$		-7.6	A
- Pulsed (Note 1)	I_{DM}	-48	A
Gate-Source Voltage	V_{GSS}	± 25	V
Single Pulse Avalanche Energy (Note 2)	E_{AS}	300	mJ
Avalanche Current (Note 1)	I_{AR}	-12	A
Repetitive Avalanche Energy (Note 1)	E_{AR}	4.4	mJ
Peak Diode Recovery dv/dt (Note 3)	dv/dt	-7	V/ns



Power Dissipation ($T_A=25^{\circ}\text{C}$) *	P_D	2.5	W
Power Dissipation ($T_C=25^{\circ}\text{C}$)		44	W
- Derate above 25°C		0.35	W/ $^{\circ}\text{C}$
Operating and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^{\circ}\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	$^{\circ}\text{C}$

5. Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction to Case, Max	$R_{\theta JC}$	2.85	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max	$R_{\theta JA}$	110	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Ambient (*1 in ² Pad of 2-oz Copper), Max	$R_{\theta JA}$	50	$^{\circ}\text{C/W}$

* When mounted on the minimum pad size recommended (PCB Mount).



6. Electrical Characteristic (T_c=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-60			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I _D =-250μA Referenced to 25°C		-0.06		V/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V			-1	μA
		V _{GS} =-48V, T _C =125°C			-10	μA
Gate-Body Leakage Current, Forward	I _{GSSF}	V _{GS} =-25V, V _{DS} =0V			-100	nA
Gate-Body Leakage Current, Reverse	I _{GSSR}	V _{GS} =25V, V _{DS} =0V			100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-1.1	-2	-3	V
Static Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-6A		110	135	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-30V, I _D =-6A		8.7		S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-25V, V _{GS} =0V, f=1MHz		690	900	pF
Output Capacitance	C _{oss}			325	420	pF
Reverse Transfer Capacitance	C _{rss}			80	105	pF
Switching Characteristics						
Turn-On DelayTime	t _{D(on)}	V _{DD} =-30V, I _D =-8.5A R _G =25Ω (Note 4)		13	35	ns
Turn-On Rise Time	t _r			100	210	ns
Turn-Off DelayTime	t _{D(off)}			22	55	ns
Turn-Off Fall Time	t _f			60	130	ns
Total Gate Charge	Q _g	V _{DS} =-48V, I _D =-12A V _{GS} =-10V (Note 4)		21	27	nC
Gate to Source Charge	Q _{gs}			4.2		nC
Gate to Drain Charge	Q _{gd}			10		nC



Drain–Source Diode Characteristics						
Maximum Continuous Drain-Source Diode Forward Current	I_S				-12	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				-48	A
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-12A$			-4	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=-17A$ $dI_F/dt = 100A/\mu s$		92		ns
Reverse Recovery Charge	Q_{rr}			0.32		μC

- Notes:
- 1. Repetitive rating : pulse-width limited by maximum junction temperature.
 - 2. $L=2.4mH, I_{AS}=-12A, V_{DD}=-25V, R_G=25\Omega$, starting $T_J=25^{\circ}C$.
 - 3. $I_{SD} \leq -17A, di/dt \leq 300 A/\mu s, V_{DD} \leq BV_{DSS}$, starting $T_J=25^{\circ}C$.
 - 4. Essentially independent of operating temperature.



7.1 Typical characteristic

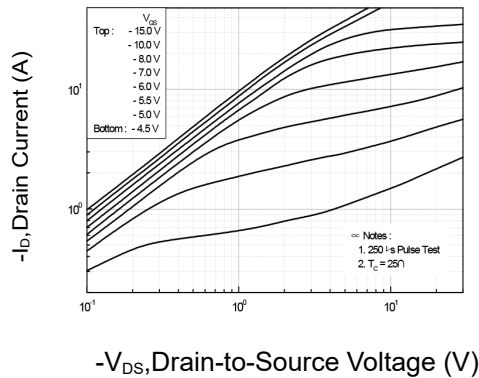


Figure 1: Output Characteristics

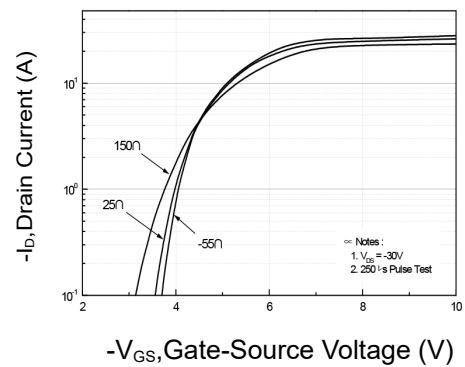


Figure 2: Transfer Characteristics

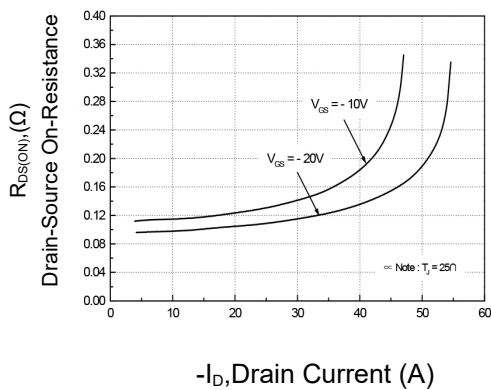


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

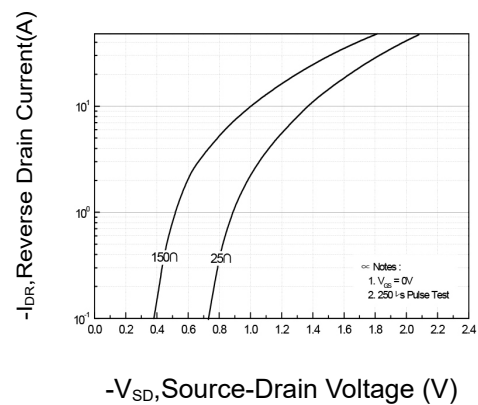


Figure 4: Body Diode Forward Voltage Variation vs. Source Current and Temperature

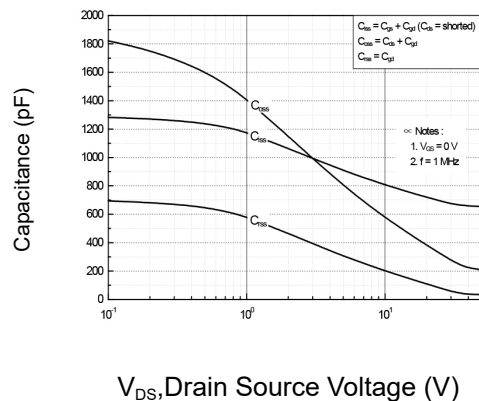


Figure 5: Capacitance Characteristics

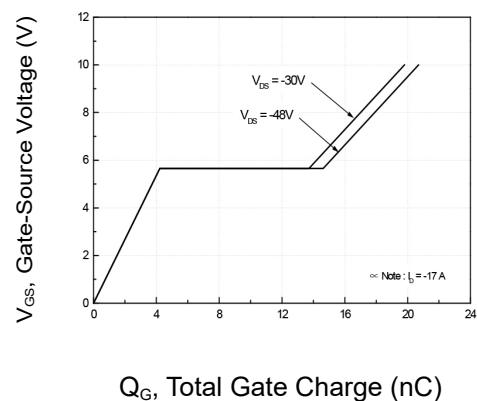


Figure 6: Gate Charge Characteristics



7.2 Typical characteristic

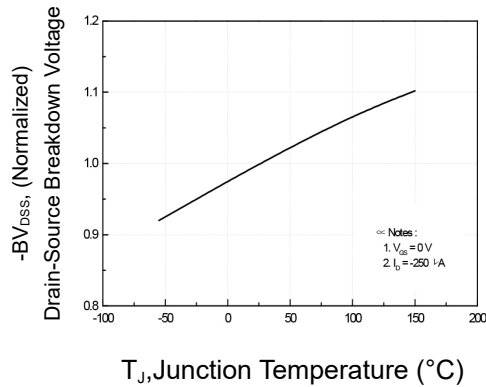


Figure 7: SBreakdown Voltage Variation vs. Temperature

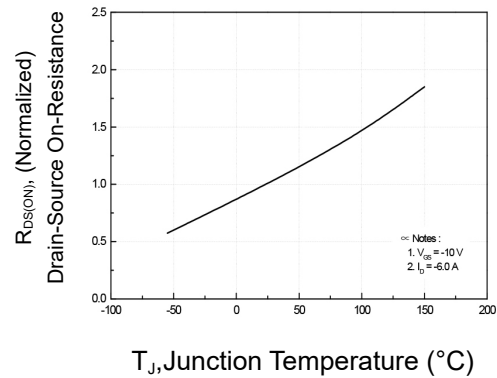


Figure 8: On-Resistance Variation vs. Temperature

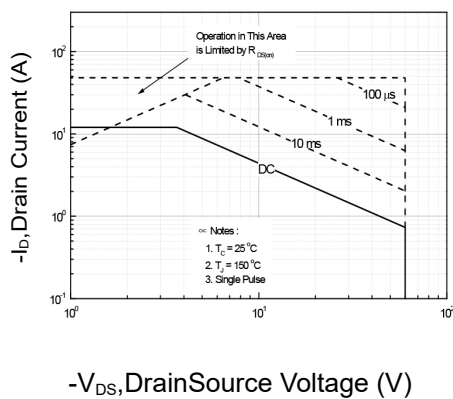


Figure 9: Maximum Safe Operating Area

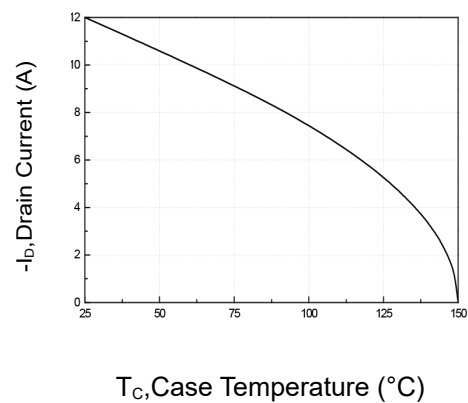


Figure 10: Maximum Drain Current vs. Case Temperature

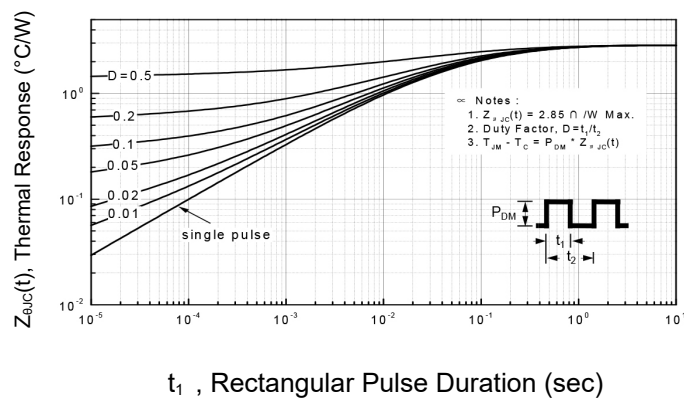


Figure 11: Transient Thermal Response Curve



7.3 Typical characteristic

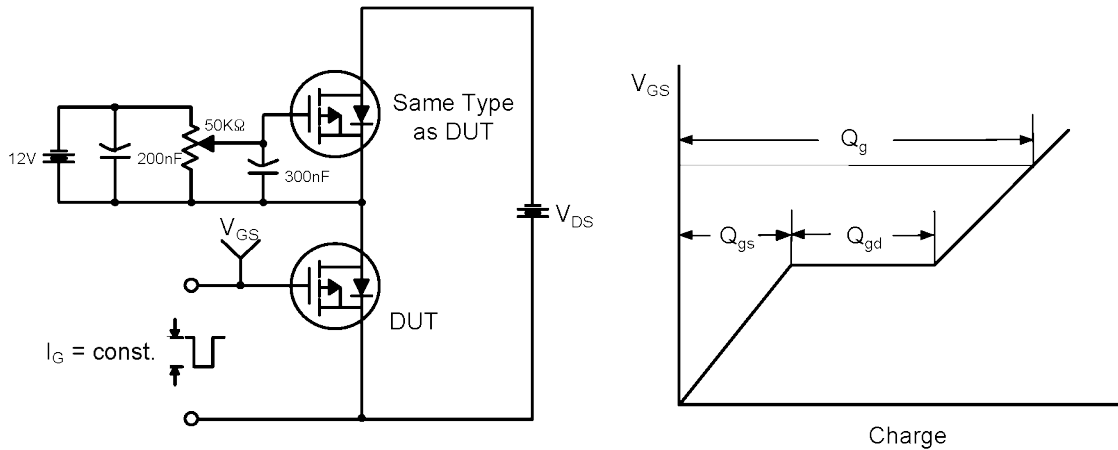


Figure 12. Gate Charge Test Circuit & Waveform

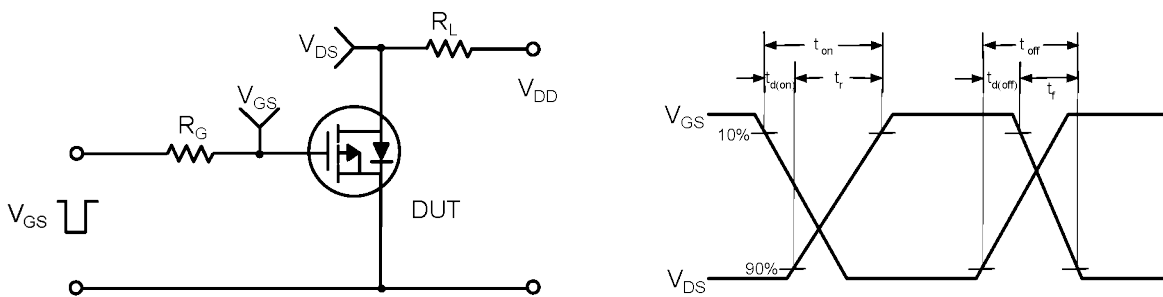


Figure 13. Resistive Switching Test Circuit & Waveforms

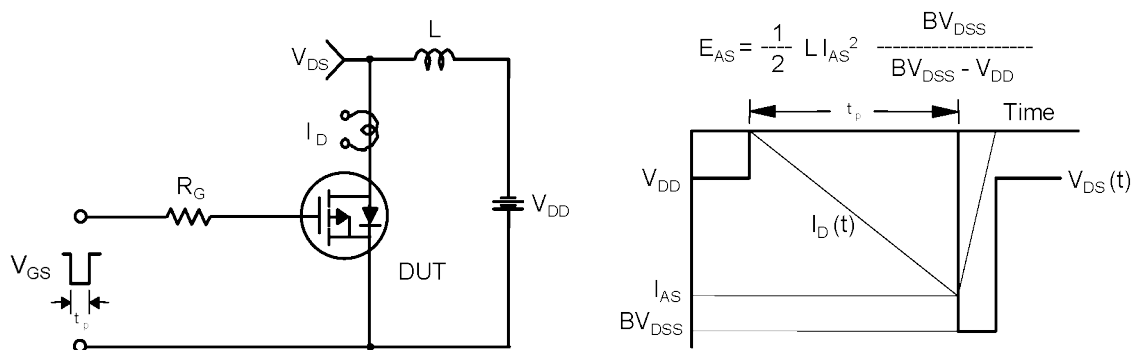


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms



7.4 Typical characteristic

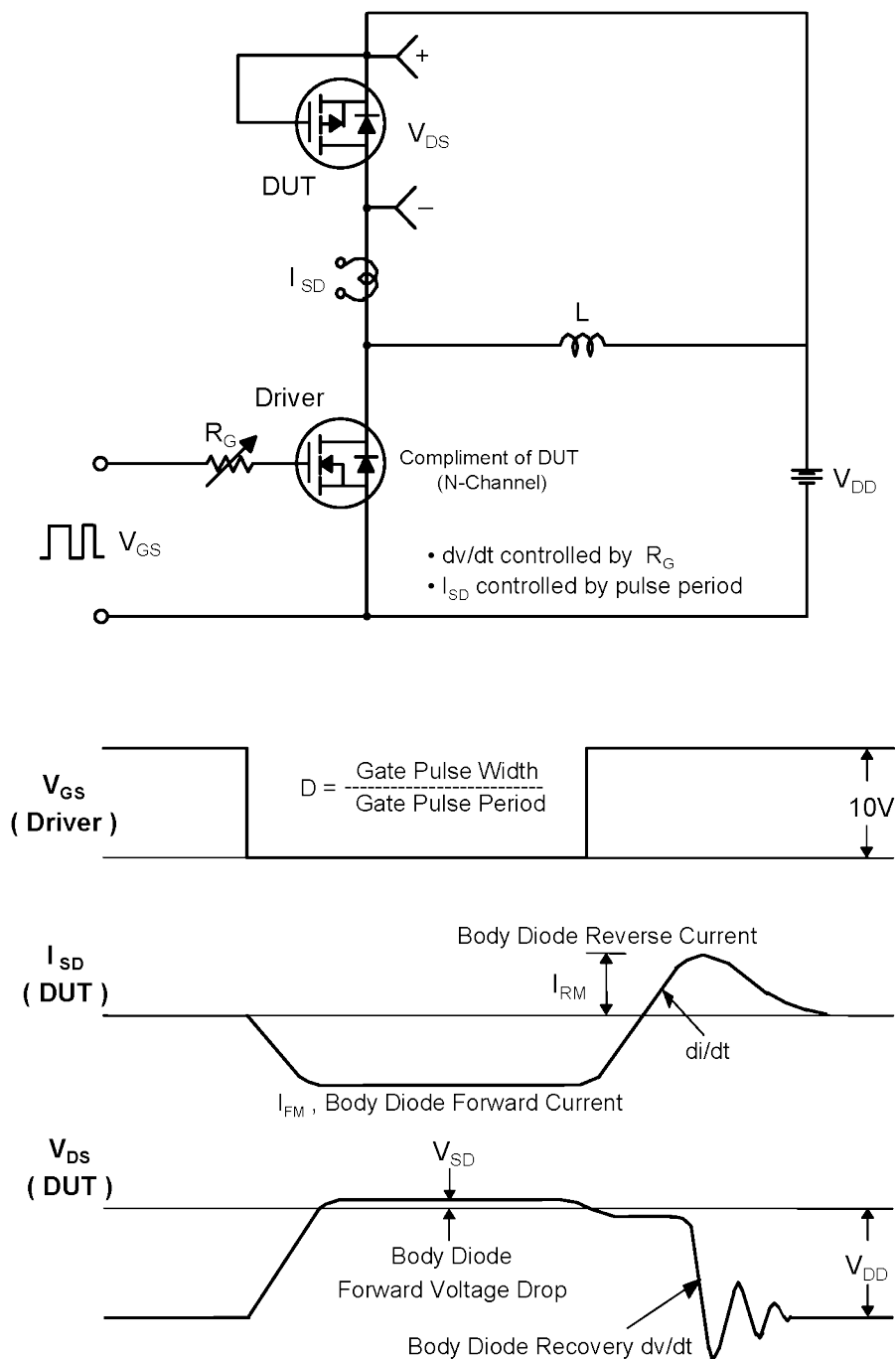
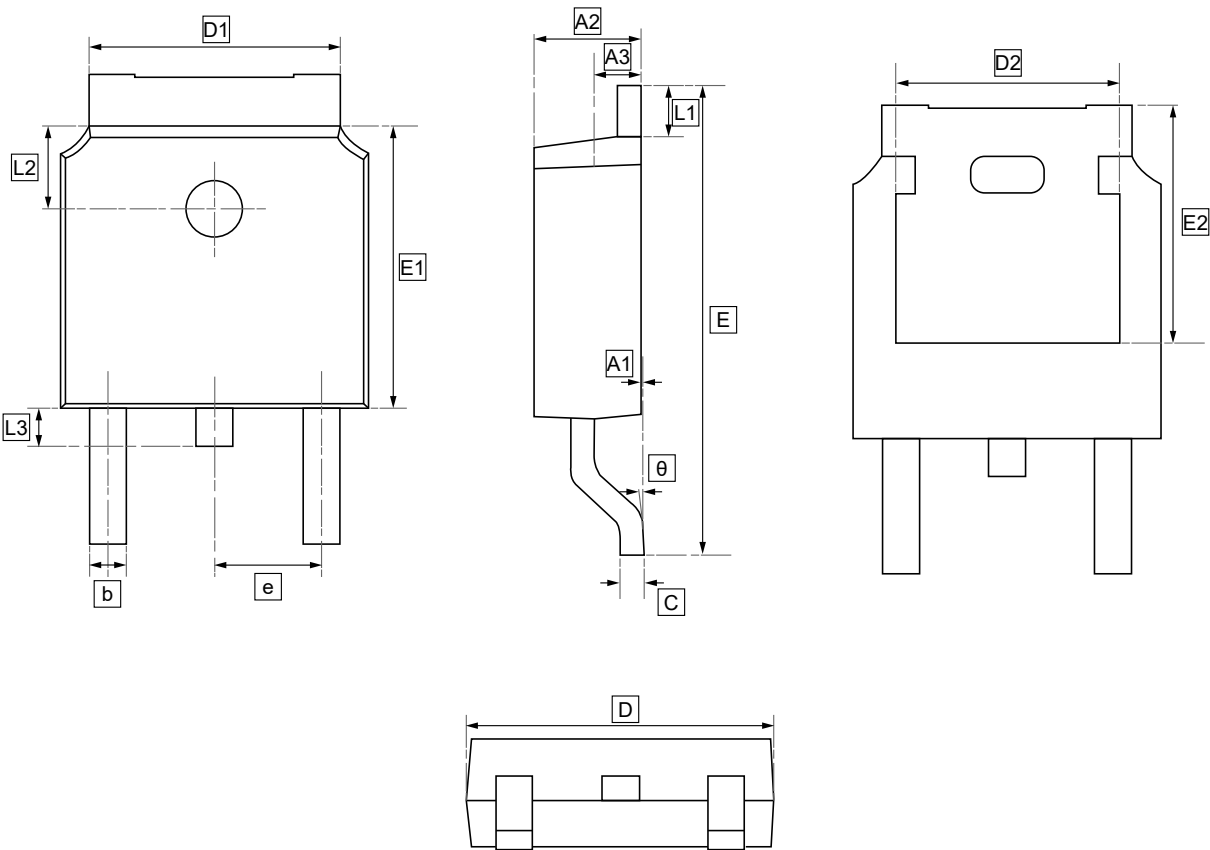


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms



8.TO-252 Package Outline Dimensions

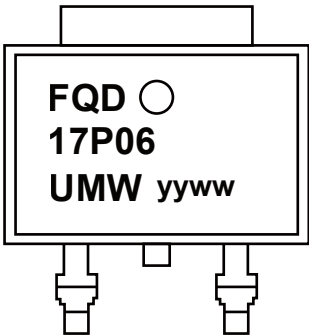


DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286 BSC	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38		1.27	1.90	1.00	8.00



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FQD17P06TM	TO-252	2500	Tape and reel



10.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.