

1. Description

The 50N06 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

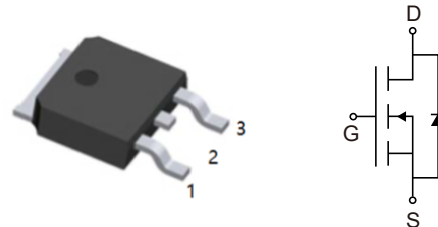
2. Features

- $V_{DS(V)}=60V$
- $I_D=50A$
- $R_{DS(ON)}=12m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}=16m\Omega(V_{GS}=4.5V)$

3. Pinning information

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

TO-252(DPAK)
top view



4. Absolute Maximum Ratings $T_A=25^{\circ}C$

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	60	V
Gate-Source Voltage		V_{GS}	± 20	
Drain Current-Continuous ^{Note3}	$T_C=25^{\circ}C$	I_D	50	A
	$T_C=100^{\circ}C$		33	
Drain Current-Pulsed ^{Note1}		I_{DM}	200	
Avalanche Energy ^{Note4}		E_{AS}	64	mJ
Maximum Power Dissipation	$T_C=25^{\circ}C$	P_D	105	W
Storage Temperature Range		T_{STG}	-55 to 150	$^{\circ}C$
Operating Junction Temperature Range		T_J	-55 to 150	$^{\circ}C$



5. Thermal Resistance Rating

Parameter	Symbol	Typ	Max	Units
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$		1.4	$^{\circ}\text{C/W}$

6. SPECIFICATIONS ($T_J = 25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _{DS} =250μA	60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V			1	μA
Gate-Body Leakage	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
ON CHARACTERISTIC						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _{DS} =250μA	1	1.6	2.5	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _{DS} =30A		12	17	mΩ
		V _{GS} =4.5V, I _{DS} =20A		16	21	mΩ
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =25V, V _{GS} =0V, f=1MHz		2928		pF
Output Capacitance	C _{oss}			141		pF
Reverse Transfer Capacitance	C _{rss}			120		pF
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{D(on)}	V _{GS} =10V, V _{DS} =30V R _{GEN} =1.8Ω, I _D =25A		7.5		ns
Rise Time	t _r			6		ns
Turn-Off Delay Time	t _{D(off)}			28.4		ns
Fall Time	t _f			5.5		ns
Total Gate Charge at 10V	Q _g	V _{DS} =30V, I _{DS} =25A, V _{GS} =10V		50		nC
Gate to Source Gate Charge	Q _{gs}			6		nC
Gate to Drain“Miller”Charge	Q _{gd}			15		nC



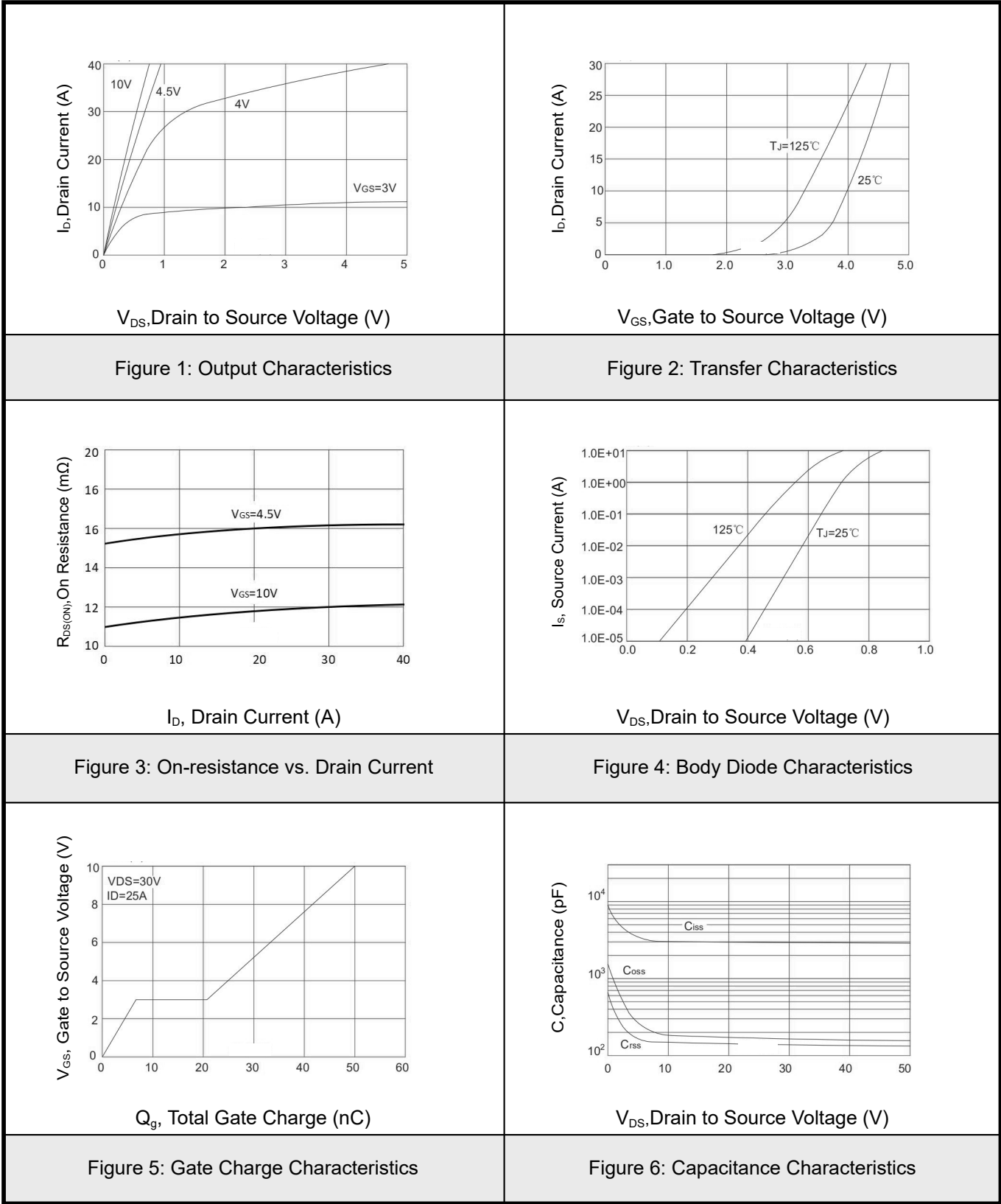
DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{DS}=30A$			1.2	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}C, I_F=25A$		29		nS
Reverse Recovery Charge	Q_{rr}			42		uC

Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, $t_s \leq 10sec$.
- 3: Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 4: E_{AS} condition: $L=0.5mH, V_{DD}=10V, V_G=10V, V_{GATE}=20V, Start T_J=25^{\circ}C$.

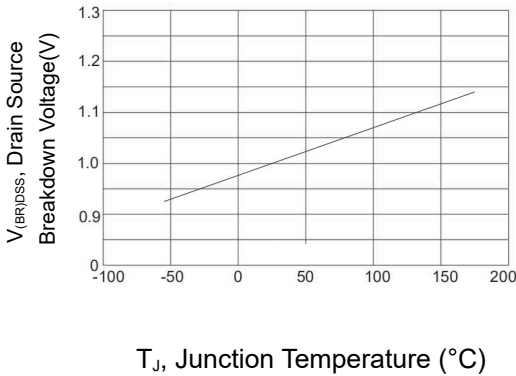
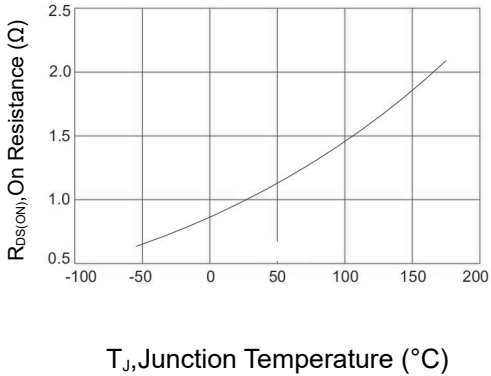
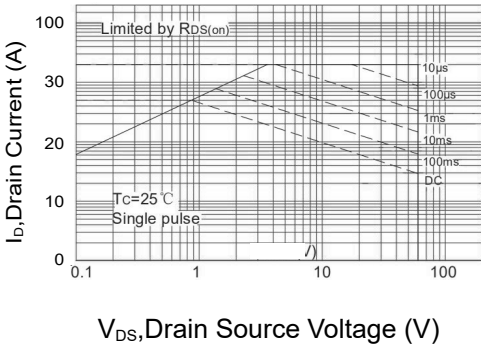
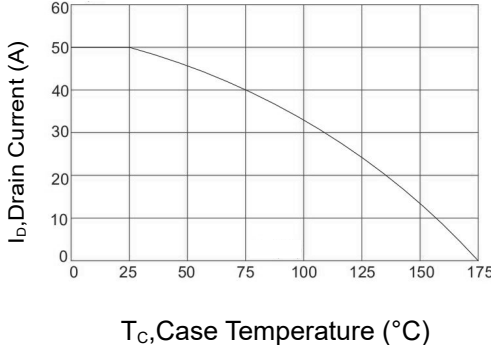
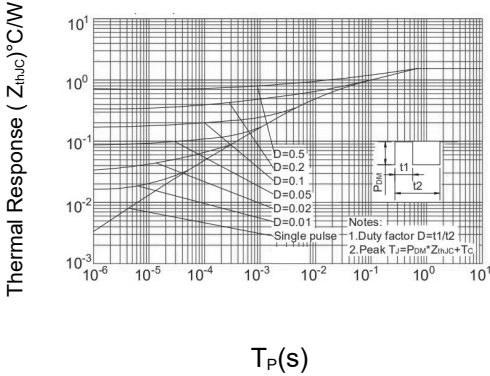


7.1 Typical Characteristics





7.2Typical Characterisitics

 $V_{BR(DSS)}$, Drain Source Breakdown Voltage(V) T_J, Junction Temperature (°C)	 $R_{DS(ON)}$, On Resistance (Ω) T_J, Junction Temperature (°C)
Figure 7: Normalized Breakdown Voltage vs. Junction Temperature	Figure 8: Normalized on Resistance vs. Junction Temperature
 I_D, Drain Current (A) V_{DS}, Drain Source Voltage (V)	 I_D, Drain Current (A) T_C, Case Temperature (°C)
Figure 9: Maximum Safe Operating Area	Figure 10: Safe Operating Area
 Thermal Response ($Z_{\theta JA}$) °C/W T_P(s)	
Figure 11: Maximum EffectiveTransient Thermal Impedance, Junction-to-Case	

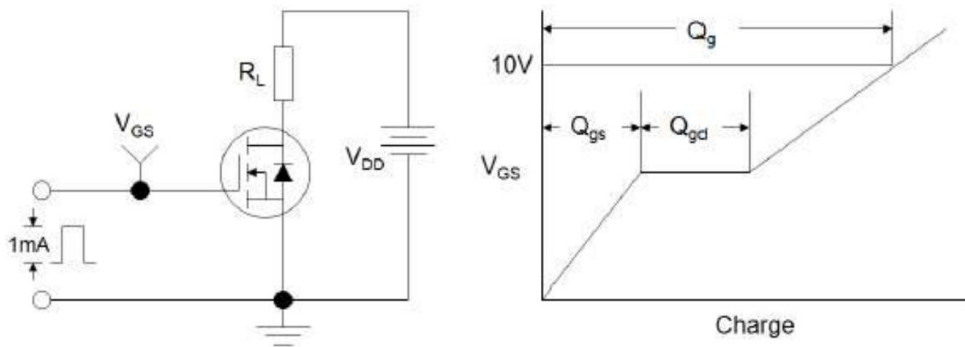


Figure1:Gate Charge Test Circuit & Waveform

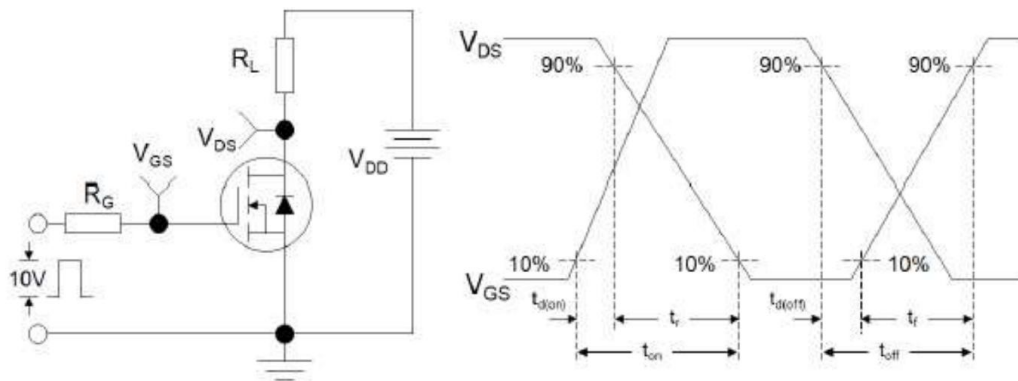


Figure 2: Resistive Switching Test Circuit & Waveforms

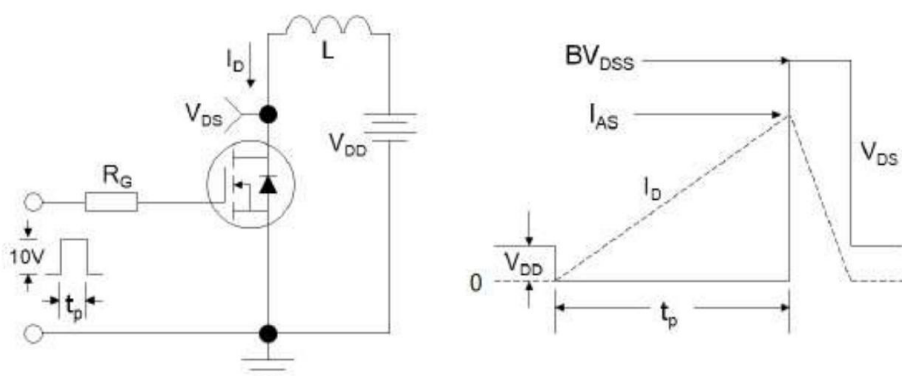
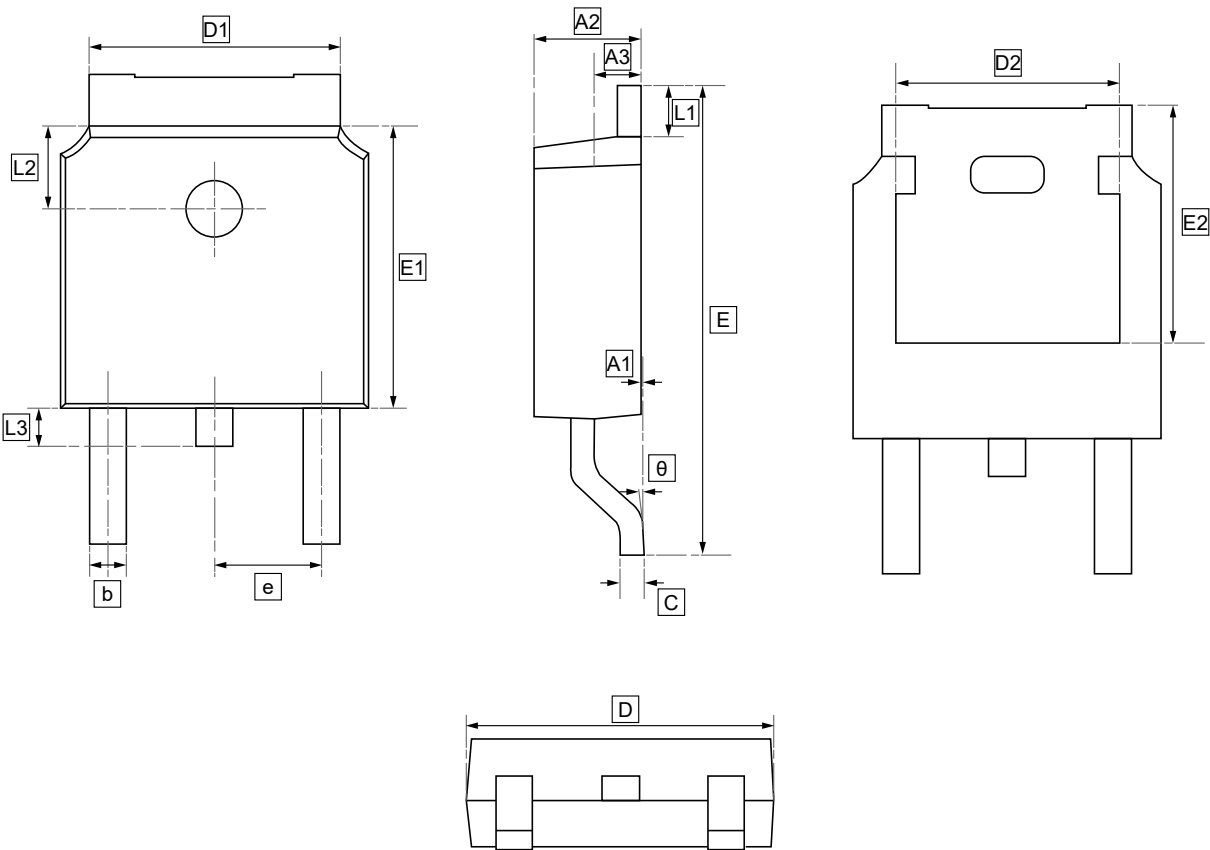


Figure 3:Unclamped inductive Switching Test Circuit & Waveforms



8.TO-252 Package Outline Dimensions

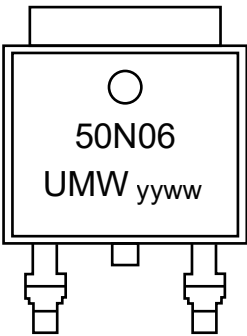


DIMENSIONS (mm are the original dimensions)

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	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		BSC	1.27	1.90	1.00



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW 50N06	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.