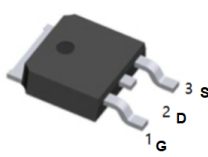
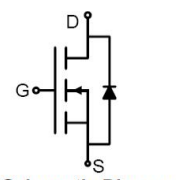


60V N-Channel Enhancement Mode Power MOSFET

50N06

<p><b>General Description</b></p> <p>The 50N06 uses advanced trench technology and design to provide excellent <math>R_{DS(ON)}</math> with low gate charge. It can be used in a wide variety of applications.</p> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS} = 60V, I_D = 50A</math></li> <li>● <math>R_{DS(ON)}, 12m\Omega</math> (Typ) @ <math>V_{GS} = 10V</math></li> <li>● <math>R_{DS(ON)}, 16m\Omega</math> (Typ) @ <math>V_{GS} = 4.5V</math></li> <li>● Advanced Trench Technology</li> <li>● Excellent <math>R_{DS(ON)}</math> and Low Gate Charge</li> <li>● Lead free product is acquired</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Load Switch</li> <li>● PWM Application</li> <li>● Power management</li> </ul>	 <p>TO-252(DPAK) top view</p>  <p>Schematic Diagram</p>
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Absolute Maximum Ratings(TA=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit	
Drain-Source Voltage	$V_{DS}$	60	V	
Gate-Source Voltage	$V_{GS}$	±20	V	
Drain Current-Continuous <sup>Note3</sup>	$I_D$	TC=25°C	50	A
		TC=100°C	33	A
Drain Current-Pulsed <sup>Note 1</sup>	$I_{DM}$	200	A	
Avalanche Energy <sup>Note 4</sup>	$E_{AS}$	64	mJ	
Maximum Power Dissipation	$P_D$	105	W	
Storage Temperature Range	$T_{STG}$	-55 to +150	°C	
Operating Junction Temperature Range	$T_J$	-55 to + 150	°C	

Thermal Resistance

Parameter	Symbol	Min.	Typ.	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	-	-	1.4	°C/W

## 60V N-Channel Enhancement Mode Power MOSFET

### Electrical Characteristics(T<sub>J</sub>=25°C unless otherwise noted)

OFF CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =250uA	60	-	-	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =60V, V <sub>GS</sub> =0V	-	-	1.0	uA
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA

ON CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250uA	1.0	1.6	2.5	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>DS</sub> =30A	-	12	17	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =20A	-	16	21	mΩ

DYNAMIC CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input Capacitance	C <sub>ISS</sub>	V <sub>DS</sub> =25V, V <sub>GS</sub> = 0V, f=1MHz	-	2928	-	pF
Output Capacitance	C <sub>OSS</sub>		-	141	-	
Reverse Transfer Capacitance	C <sub>rss</sub>		-	120	-	

SWITCHING CHARACTERISTICS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Delay Time	T <sub>d(on)</sub>	V <sub>GS</sub> =10V, V <sub>DS</sub> =30V, R <sub>GEN</sub> =1.8Ω I <sub>D</sub> =25A	-	7.5	-	ns
Rise Time	t <sub>r</sub>		-	6.0	-	
Turn-Off Delay Time	T <sub>d(off)</sub>		-	28.4	-	
Fall Time	t <sub>f</sub>		-	5.5	-	
Total Gate Charge at 10V	Q <sub>g</sub>	V <sub>DS</sub> =30V, I <sub>DS</sub> =25A, V <sub>GS</sub> =10V	-	50	-	nC
Gate to Source Gate Charge	Q <sub>gs</sub>		-	6	-	
Gate to Drain"Miller"Charge	Q <sub>gd</sub>		-	15	-	

DRAIN-SOURCE DIODE CHARACTERISTICS AND MAXIMUM RATINGS						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Diode Forward Voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>DS</sub> =30A	-	-	1.2	V
Reverse Recovery Time	t <sub>rr</sub>	T <sub>J</sub> =25°C, I <sub>F</sub> =25A di/dt=100A/us	-	29	-	nS
Reverse Recovery Charge	Q <sub>rr</sub>		-	42	-	nC

#### Notes:

- 1: Repetitive rating, pulse width limited by maximum junction temperature.
- 2: Surface mounted on FR4 Board, t<sub>s</sub>≤10sec.
- 3: Pulse width ≤ 300μs, duty cycle ≤ 2%.
- 4: EAS condition: L=0.5mH, V<sub>DD</sub>=10V, V<sub>G</sub>=10V, V<sub>GATE</sub>=20V, Start T<sub>J</sub>=25°C.

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Figure 1: Output Characteristics

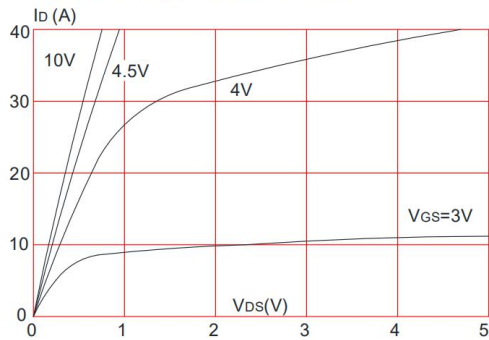


Figure 2: Typical Transfer Characteristics

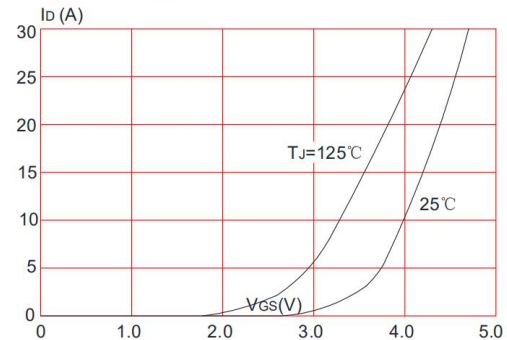


Figure 3: On-resistance vs. Drain Current

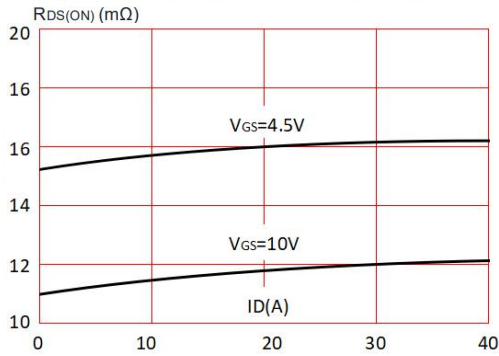


Figure 4: Body Diode Characteristics

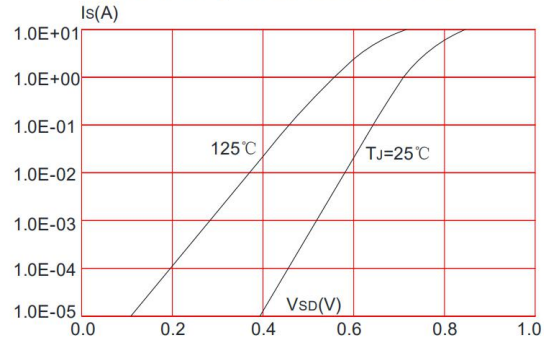


Figure 5: Gate Charge Characteristics

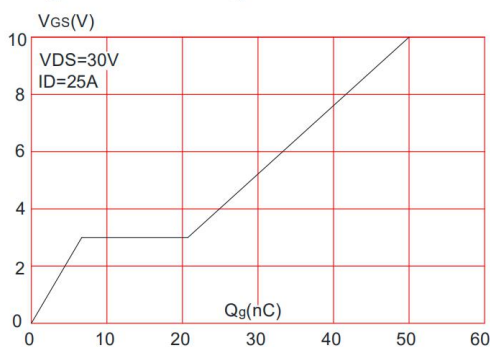
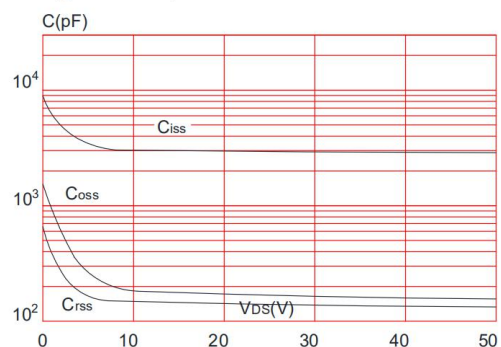
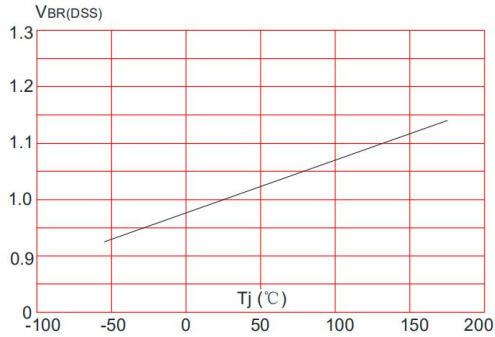


Figure 6: Capacitance Characteristics

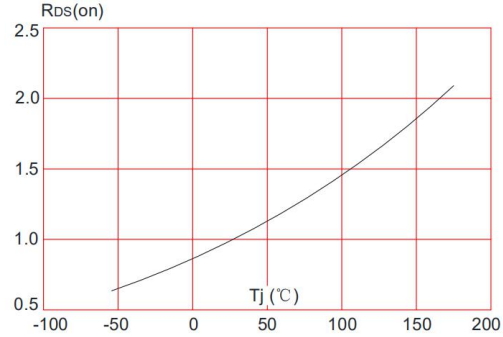


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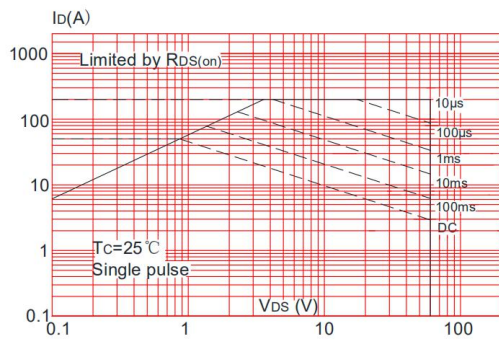
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



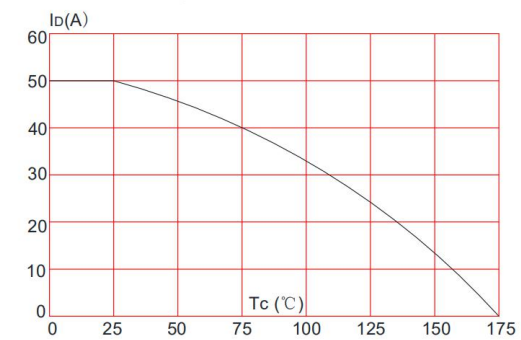
**Figure 8:** Normalized on Resistance vs. Junction Temperature



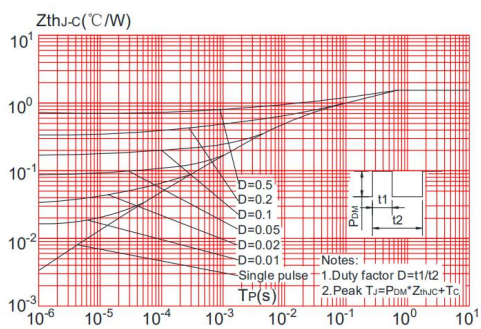
**Figure 9:** Maximum Safe Operating Area



**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



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



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Test Circuit

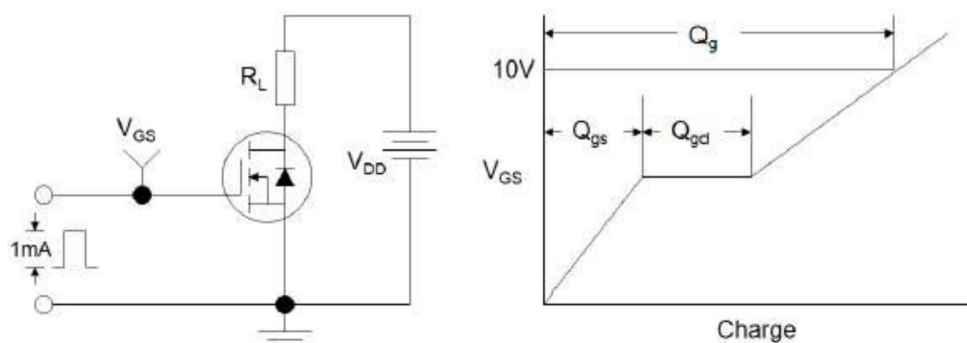


Figure1: Gate Charge Test Circuit & Waveform

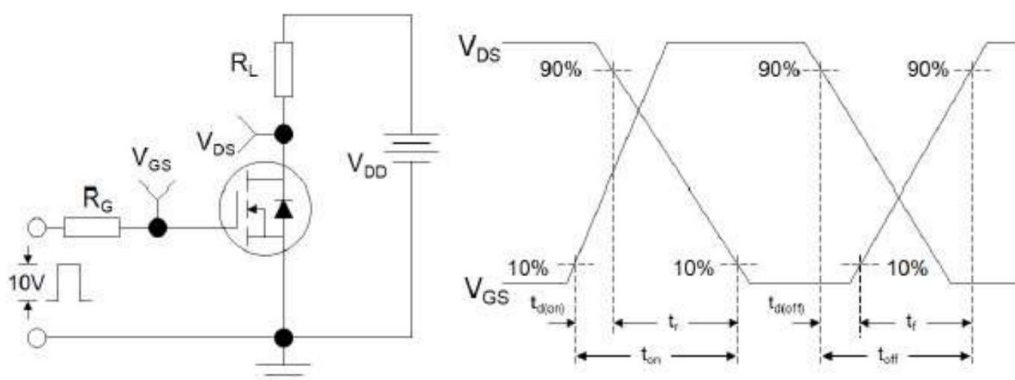


Figure 2: Resistive Switching Test Circuit & Waveforms

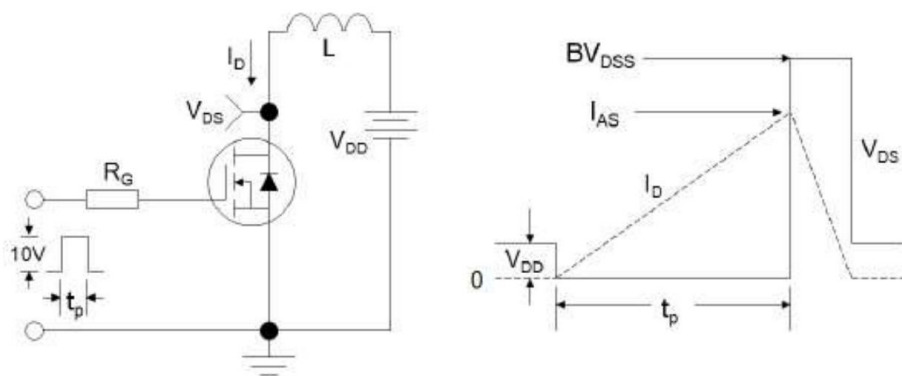
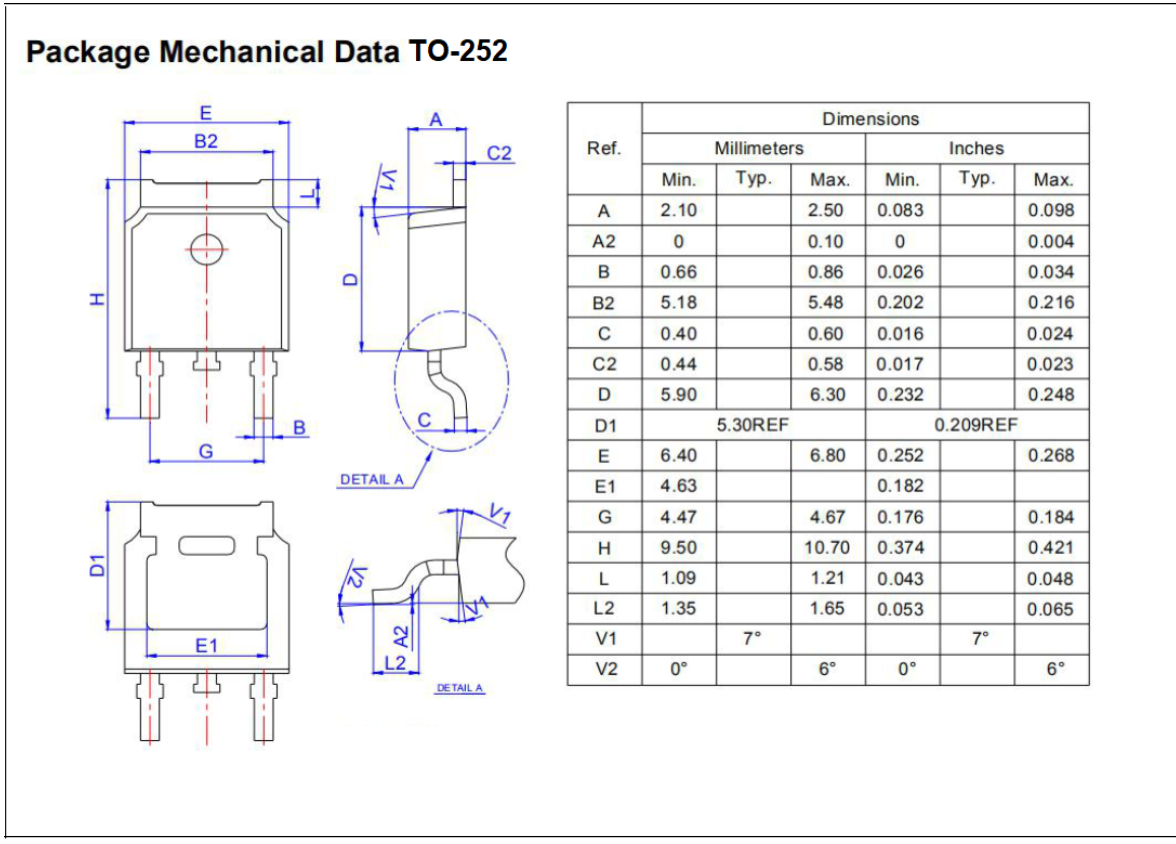


Figure 3: Unclamped Inductive Switching Test Circuit & Waveforms

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**Ordering information**

Order code	Package	Baseqty	Delivery mode
UMW 50N06	TO-252	2500	Tape and reel