

DESCRIPTION

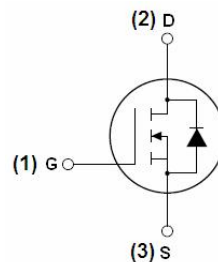
The 21N06 uses advanced trench technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

GENERAL FEATURES

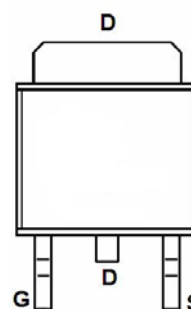
- | V_{DSS} | $R_{DS(ON)}$
@ 10V (typ) | I_D |
|-----------|-----------------------------|-------|
| 60V | 24 m Ω | 21 A |
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized Avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation
- Special process technology for high ESD capability

Application

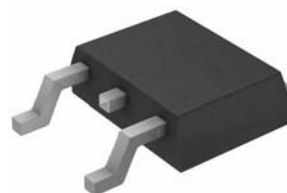
- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply



Schematic diagram



Marking and pin Assignment



TO-252

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	21	A
Drain Current-Continuous($T_C=100^\circ\text{C}$)	$I_D(100^\circ\text{C})$	15	A
Pulsed Drain Current	I_{DM}	63	A
Maximum Power Dissipation	P_D	45	W
Derating factor		0.3	W/ $^\circ\text{C}$
Single pulse avalanche energy (Note 5)	E_{AS}	89	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 175	$^\circ\text{C}$

Thermal Characteristic

Thermal Resistance, Junction-to-Case(Note 2)	$R_{\theta JC}$	3.33	$^\circ\text{C/W}$
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Electrical Characteristics (TA=25°C unless otherwise noted)

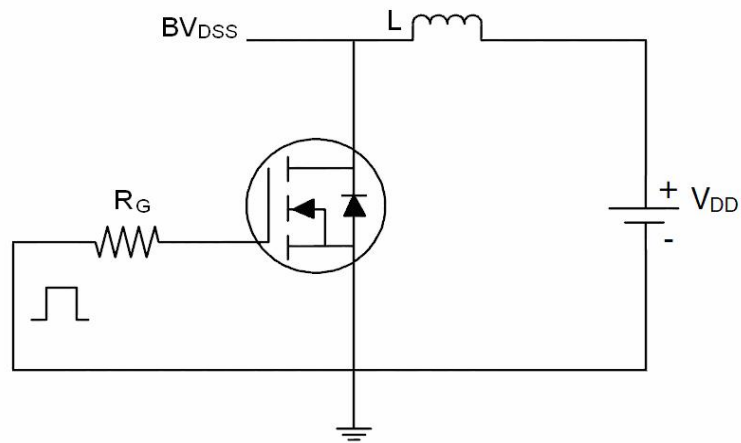
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =60V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	-	3.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =10A	-	24	30	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =4.5A	11	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =30V, V _{GS} =0V, F=1.0MHz	-	1220	-	PF
Output Capacitance	C _{oss}		-	102	-	PF
Reverse Transfer Capacitance	C _{rss}		-	92	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =30V, I _D =2A, R _L =6.7Ω V _{GS} =10V, R _G =3Ω	-	6	-	nS
Turn-on Rise Time	t _r		-	2.9	-	nS
Turn-Off Delay Time	t _{d(off)}		-	16.8	-	nS
Turn-Off Fall Time	t _f		-	2.9	-	nS
Total Gate Charge	Q _g	V _{DS} =48V, I _D =10A, V _{GS} =10V	-	25		nC
Gate-Source Charge	Q _{gs}		-	4		nC
Gate-Drain Charge	Q _{gd}		-	8		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _S =10A	-		1.2	V
Diode Forward Current (Note 2)	I _S		-	-	21	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F =10A	-	38	-	nS
Reverse Recovery Charge	Q _{rr}	di/dt = 100A/μs(Note3)	-	55	-	nC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

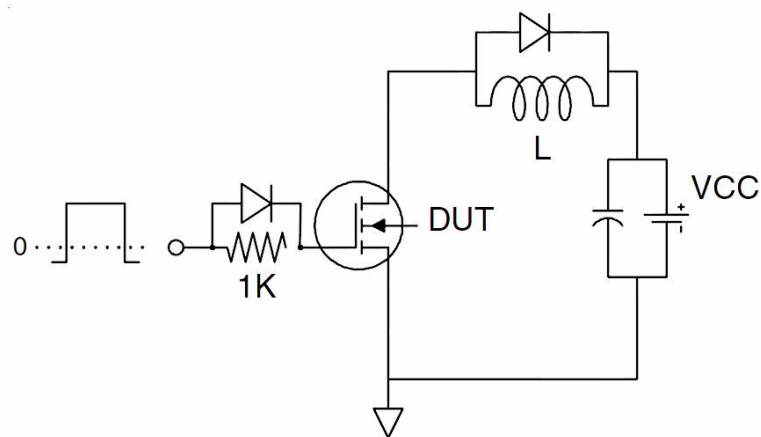
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J=25^\circ C, V_{DD}=30V, V_G=10V, L=0.5mH, R_g=25\Omega$

Test circuit

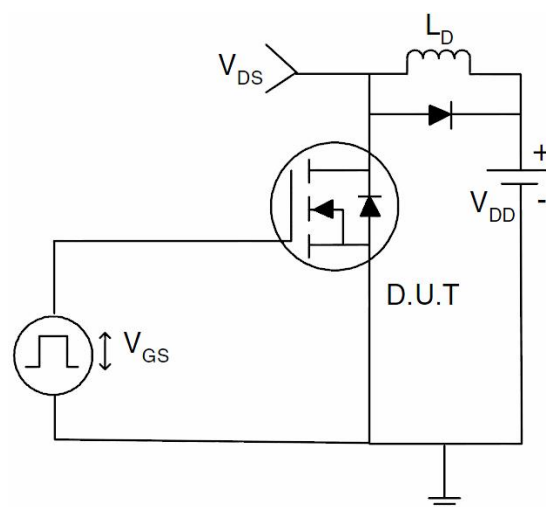
1) E_{AS} test Circuits



2) Gate charge test Circuit:



3) Switch Time Test Circuit:



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

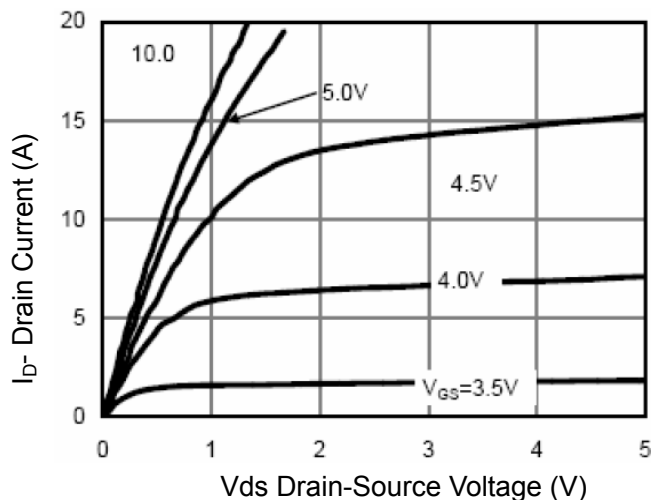


Figure 1 Output Characteristics

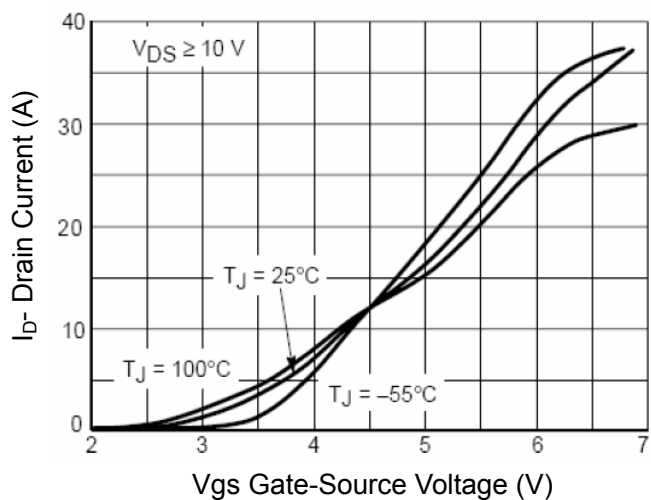


Figure 2 Transfer Characteristics

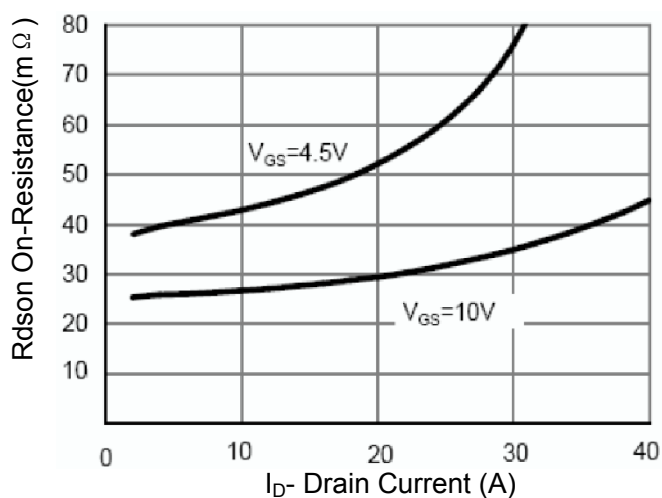


Figure 3 $R_{DS(on)}$ - Drain Current

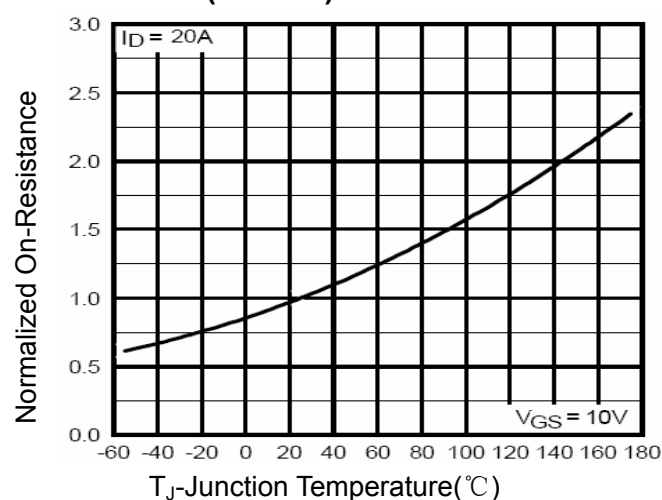


Figure 4 $R_{DS(on)}$ -Junction Temperature

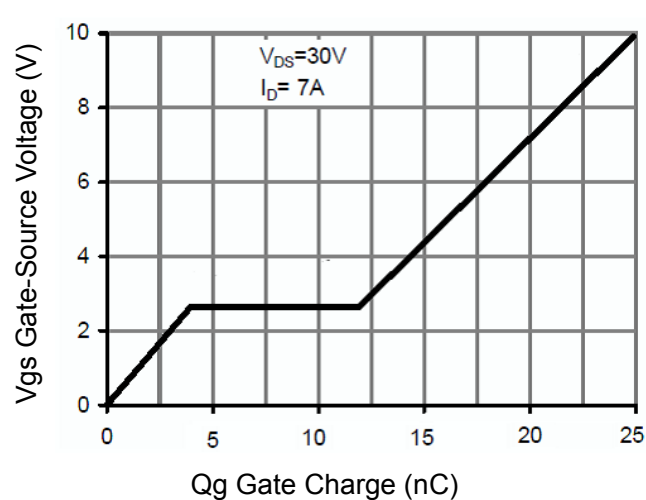


Figure 5 Gate Charge

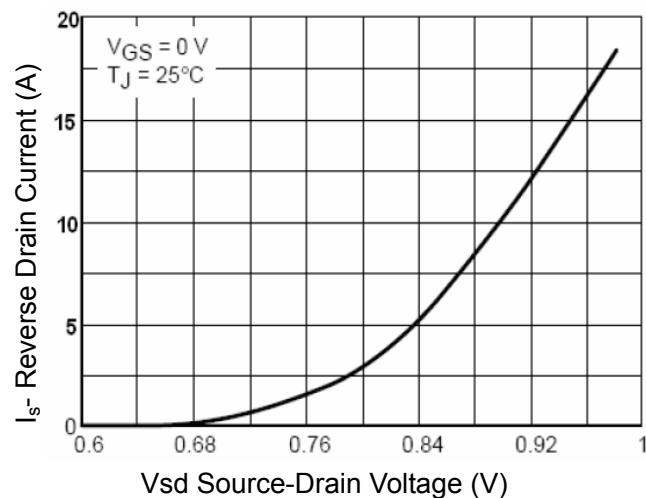


Figure 6 Source- Drain Diode Forward

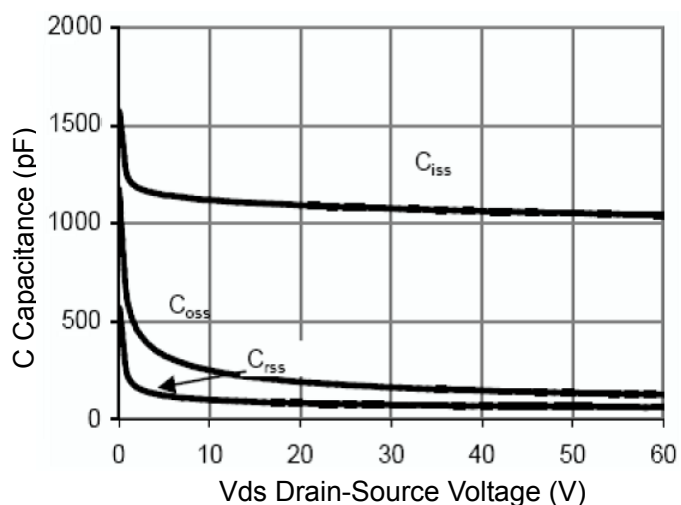


Figure 7 Capacitance vs Vds

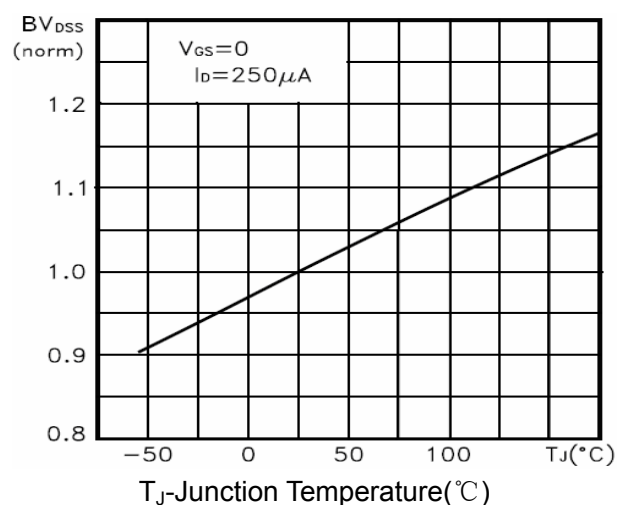


Figure 9 BV_{DSS} vs Junction Temperature

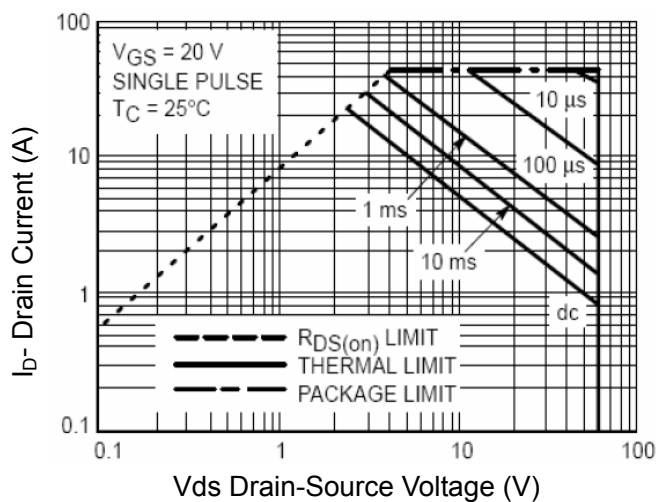


Figure 8 Safe Operation Area

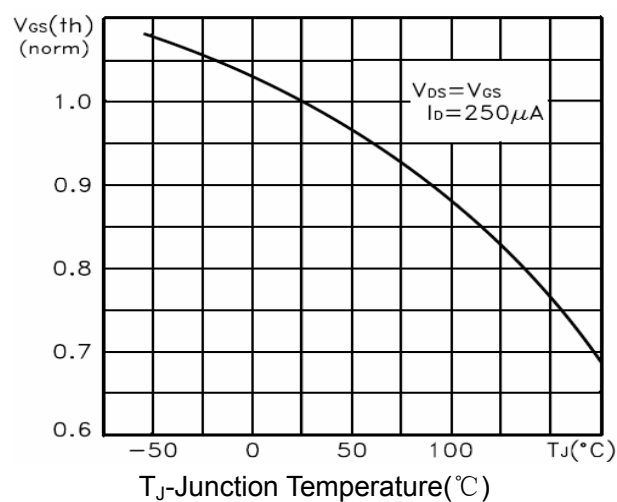


Figure 10 V_{GS(th)} vs Junction Temperature

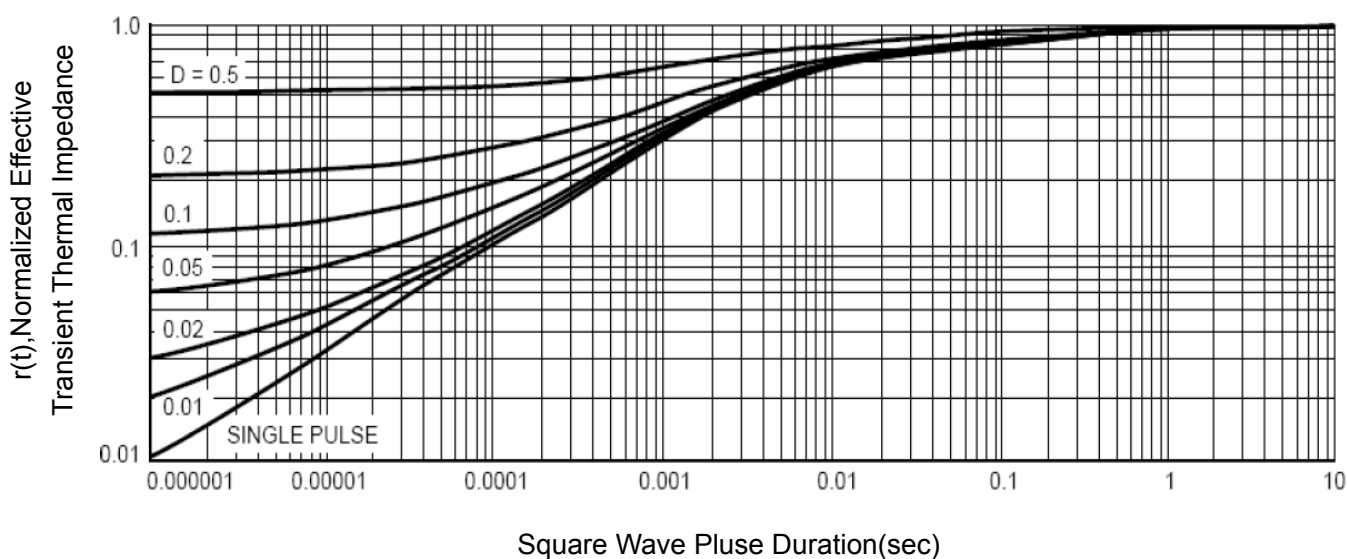


Figure 11 Normalized Maximum Transient Thermal Impedance