

## 20A 400V N Channel MOSFET

### Features

- $V_{DS} = 400V$
- $I_D = 20A @V_{GS} = 10V$
- $R_{DS(ON)} (Typ) = 0.23\Omega @V_{GS} = 10V$

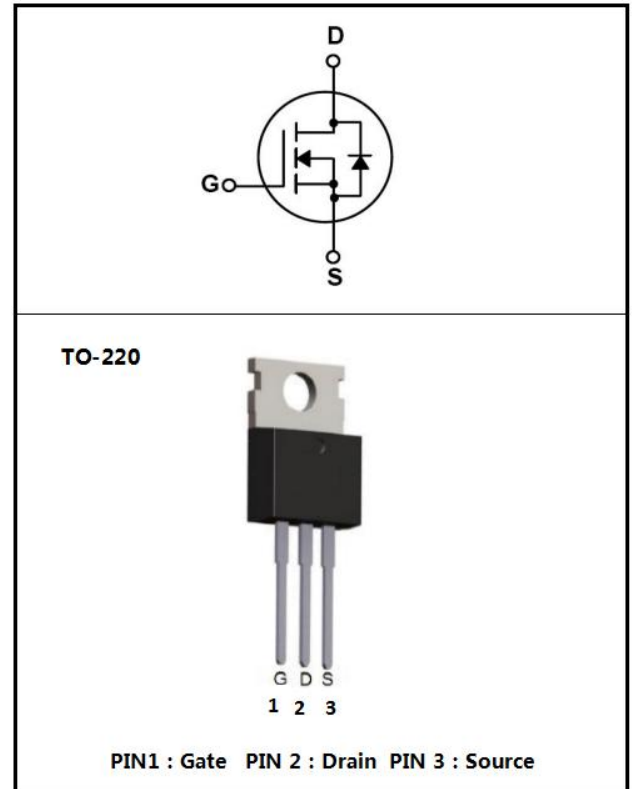
### Applications

- Power Supply
- PFC
- High Current, High Speed Switching

### Descriptions

These N-channel MOSFET are produced using advanced plane MOSFET Technology, which provides Low on-state resistance, high switching performance and excellent quality.

These devices are suitable device for SMPS, high Speed switching and general purpose applications.



**Absolute Maximum Ratings(Ta=25°C)**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DSS}$	400	V
Drain Current	$I_D(T_C=25^\circ\text{C})$	20	A
Drain Current	$I_D(T_C=100^\circ\text{C})$	13	A
Drain Current - Pulsed	$I_{DP}$	80	A
Gate-Source Voltage	$V_{GSS}$	$\pm 20$	V
Single Pulsed Avalanche Energy	$E_{AR}$	28	mJ
Repetitive Avalanche Energy	$E_{AS}$	1110	mJ
Avalanche Current	$I_{AR}$	20	A
Power Dissipation	$P_D(T_C=25^\circ\text{C})$	200	W
Junction Temperature Range	$T_j$	150	°C
Storage Temperature Range	$T_{stg}$	-55~150	°C
Thermal Resistance Junction-Ambient	$R_{thJA}$	40	°C/W
Thermal Resistance Junction-Case	$R_{thJC}$	0.63	°C/W

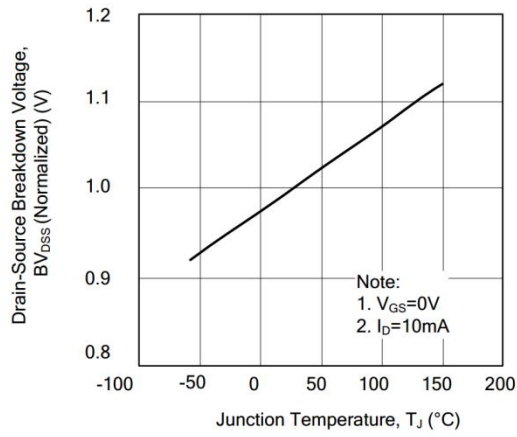
**Electrical Characteristics(Ta=25°C)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	$V_{DSS}$	$V_{GS}=0V$ $I_D=250\mu A$	400			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=400V$ $V_{GS}=0V$			1.0	$\mu A$
		$V_{DS}=400V$ $T_C=125^\circ\text{C}$			10	
Gate-Body Leakage Current, Forward	$I_{GSS}$	$V_{GS}=\pm 20V$ $V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V$ $I_D=10A$		0.23	0.40	$\Omega$
Input Capacitance	$C_{iss}$	$V_{DS}=25V$ $V_{GS}=0V$ $f=1.0\text{MHz}$		2700		pF
Output Capacitance	$C_{oss}$			400		
Reverse Transfer Capacitance	$C_{rss}$			40		
Total Gate Charge	$Q_g$	$V_{DS}=320V$ $I_D=20A$ $V_{GS}=10V$		40		nC
Gate-Source Charge	$Q_{gs}$			15		
Gate-Drain Charge	$Q_{gd}$			17		

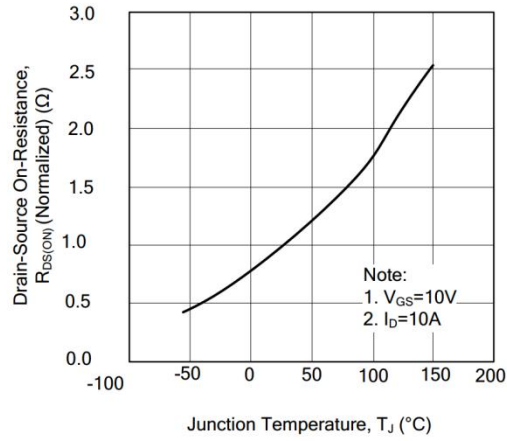
## Electrical Characteristics(Ta=25°C)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=320V$ $I_D=20A$ $R_G=25\Omega$		45		ns
Turn-On Rise Time	$t_r$			90		
Turn-Off Delay Time	$t_{d(off)}$			100		
Turn-Off Fall Time	$t_f$			60		
Maximum Continuous Drain-Source Diode Forward Current	$I_S$				20	A
Maximum Pulsed Drain-Source Diode Forward Current	$I_{SM}$				80	A
Drain-Source Diode Forward Voltage	$V_{SD}$	$V_{GS} = 0V, I_S = 20A$			1.4	V
Reverse Recovery Time	$t_{rr}$	$V_{GS} = 0V, I_S = 20A,$ $di_F/dt = 100 A/\mu s$		290		nS
Reverse Recovery Charge	$Q_{rr}$			4000		nC

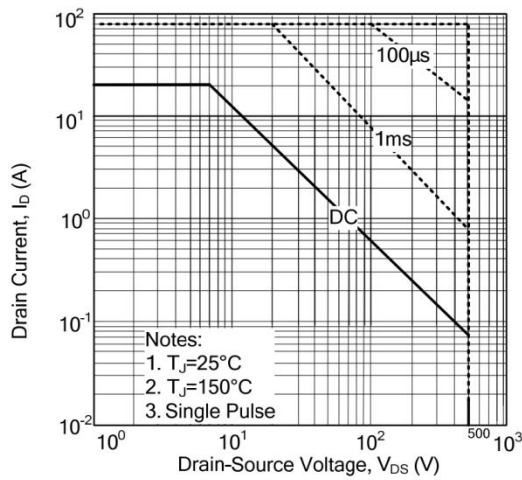
Electrical Characteristic Curve



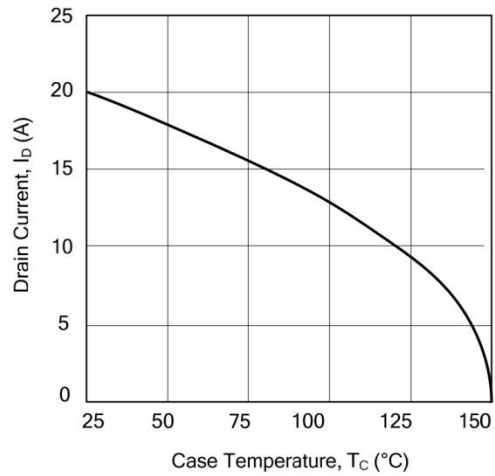
1. Breakdown Voltage Variation vs. Temperature



2. On-Resistance Junction Temperature

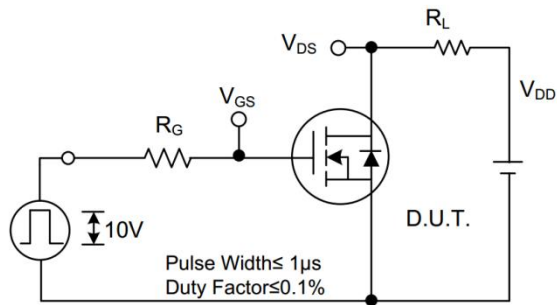


3. Safe Operating Area

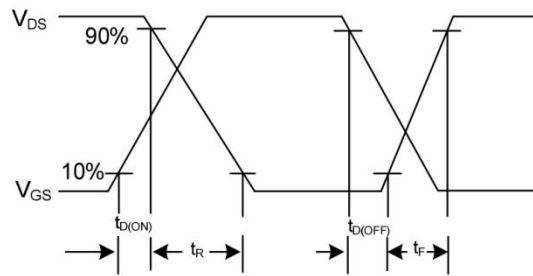


4. Maximum Drain Current vs. Case Temperature

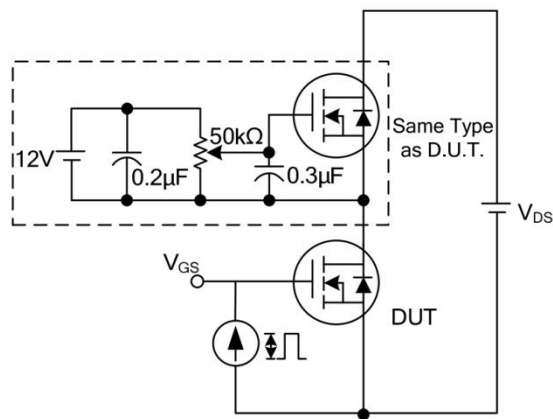
Test Circuits and Waveforms



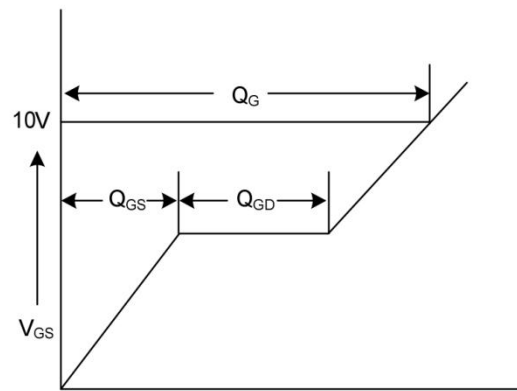
Switching Test Circuit



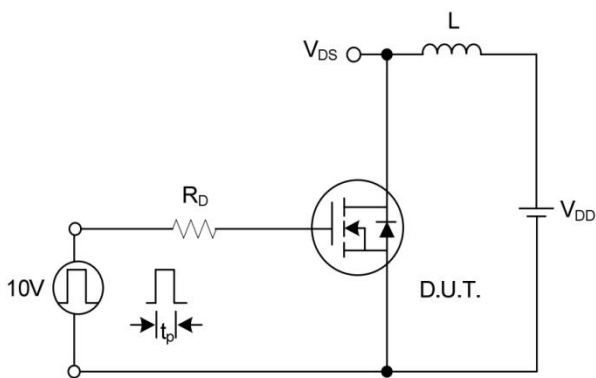
Switching Waveforms



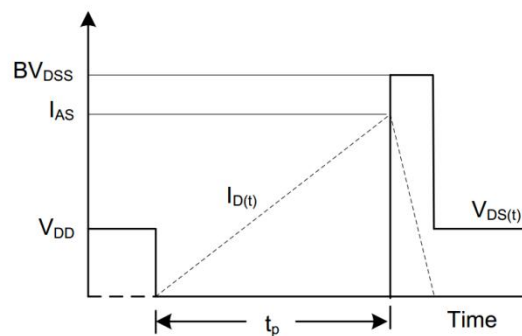
Gate Charge Test Circuit



Gate Charge Waveform

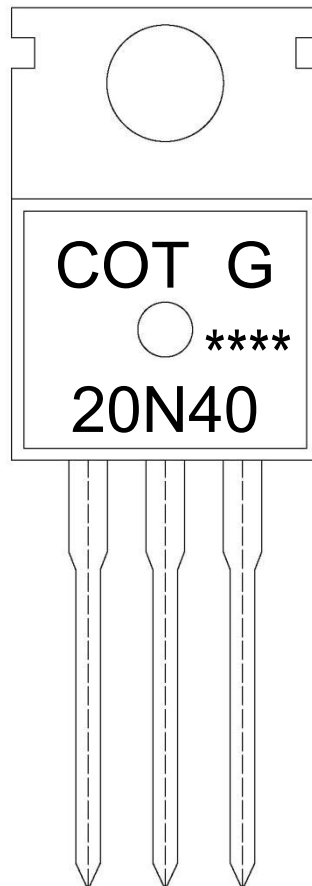


Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

Marking Instructions



Note:

- COT: Company Logo
- G: Halogen Free
- 20N40: Product Type.
- \*\*\*\*: Lot No. Code, code change with Lot No.

Packaging SPEC.

REEL INFORMATION

Package Type	Units					Dimension (unit: mm <sup>3</sup> )		
	Units/Bag	Bags/Inner Box	Units/Inner Box	Inner Boxes/Outer Box	Units/Outer Box	Bag	Inner Box	Outer Box
TO-220	200	10	2,000	5	10,000	135×190	237×172×102	560×245×195

TUBE INFORMATION

Package Type	Units					Dimension (unit: mm <sup>3</sup> )		
	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes/Outer Box	Units/Outer Box	Tube	Inner Box	Outer Box
TO-220	50	20	1,000	5	5,000	532×31.4×5.5	555×164×50	575×290×180

Package Outline Dimensions

TO-220

单位: mm

