

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
20V	4.8mΩ@4.5V	60A

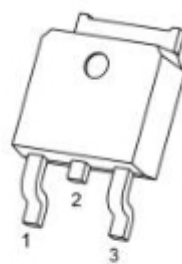
Feature

- $V_{DS} = 20V, I_D = 60A$
- $R_{DS(ON)} < 6m\Omega @ V_{GS} = 4.5V$
- High density cell design for ultra low Rdson
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high E_{AS}
- Excellent package for good heat dissipation

Applications

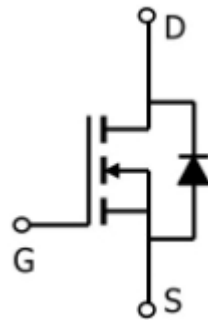
- Load switching
- Hard switched and high frequency circuits
- Uninterruptible power supply

Package

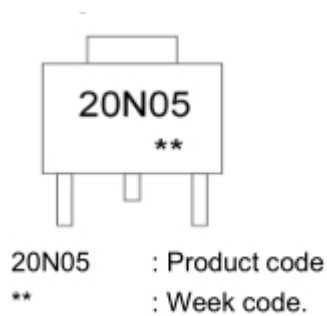


TO-252(G:1 D:2 S:3)

Circuit diagram



Marking



Absolute maximum ratings

($T_a=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	± 12	V
Drain Current-Continuous	I_D	60	A
Drain Current-Continuous ($T_C=100^{\circ}\text{C}$)	$I_{D(100^{\circ}\text{C})}$	42	A
Pulsed Drain Current ¹	I_{DM}	210	A
Maximum Power Dissipation	P_D	60	W
Derating factor		0.48	W/ $^{\circ}\text{C}$
Single pulse avalanche energy (Note 5)	E_{AS}	200	mJ
Thermal Resistance,Junction-to-Case(Note 2)	$R_{\theta JC}$	2.1	$^{\circ}\text{C}/\text{W}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}\text{C}$

Electrical characteristics

($T_A=25^{\circ}\text{C}$, unless otherwise noted)

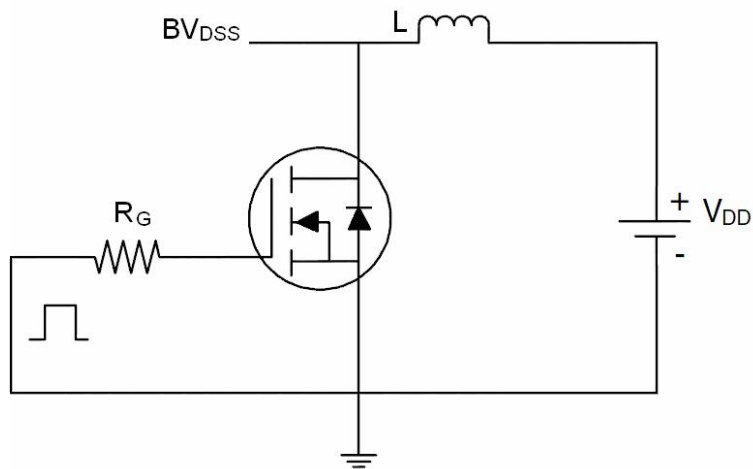
Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	20			V
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 20V, V_{GS} = 0V$			1	μA
Gate-body leakage current	I_{GSS}	$V_{GS} = \pm 12V, V_{DS} = 0V$			± 100	μA
On Characteristics ^(Note 3)						
Gate threshold voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	0.5	0.75	1	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 4.5V, I_D = 20A$		4.8	6	m Ω
		$V_{GS} = 2.5V, I_D = 15A$		6.2	9	
Forward Transconductance	g_{FS}	$V_{DS} = 10V, I_D = 20A$	15			S
Dynamic characteristics ^(Note 4)						
Input Capacitance	C_{iss}	$V_{DS} = 10V, V_{GS} = 0V, f = 1MHz$		2000		pF
Output Capacitance	C_{oss}			500		
Reverse Transfer Capacitance	C_{rss}			200		
Switching Characteristics ^(Note 4)						
Turn-On Delay Time	$T_{d(on)}$	$V_{DD} = 10V, I_D = 2A, R_L = 1\Omega, V_{GS} = 4.5V, R_G = 3\Omega$		6.4		nS
Rise Time	T_r			17.2		
Turn-Off Delay Time	$T_{d(off)}$			29.6		
Fall Time	T_f			16.8		
Total Gate Charge(4.5V)	Q_g	$V_{DS} = 10V, I_D = 20A, V_{GS} = 10V$		27		nC
Gate-Source Charge	Q_{gS}			6.5		
Gate-Drain Charge	Q_{gd}			6.4		
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V_{SD}	$I_S = 10A, V_{GS} = 0V$			1.2	V
Diode Forward Current ^(Note 2)	I_S				60	A
Reverse Recovery Time	t_{rr}	$T_J = 25^{\circ}C, I_F = 20A$		25		nS
Reverse Recovery Charge	Q_{rr}	$di/dt = 100A/\mu s$ ^(Note3)		24		nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

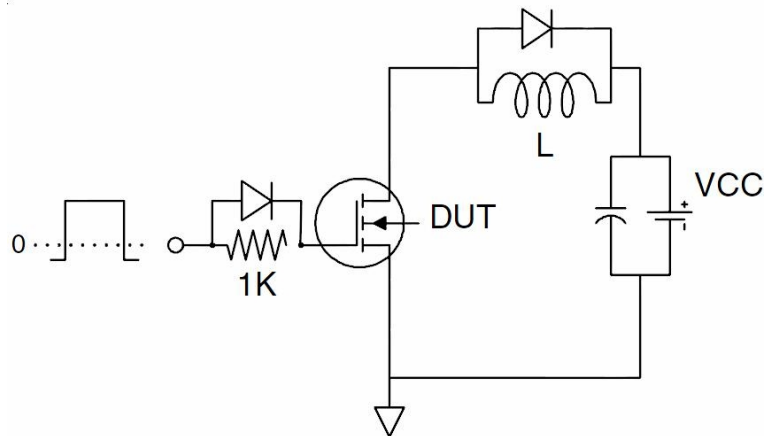
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production
5. EAS condition : $T_J = 25^{\circ}\text{C}, V_{DD} = 10V,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

Typical Characteristics

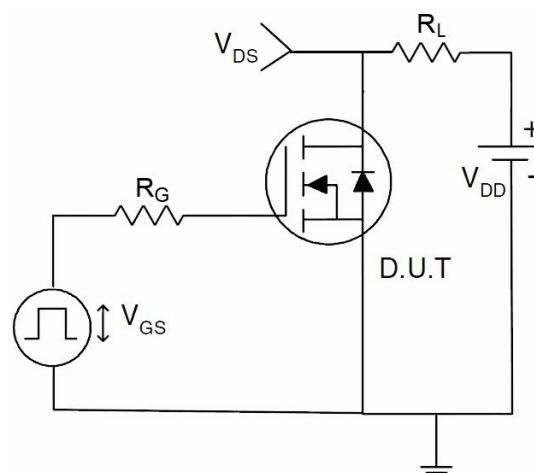
- EAS Test Circuits



- Gate Charge Test Circuit



- Switch Time Test Circuit



Typical Characteristics

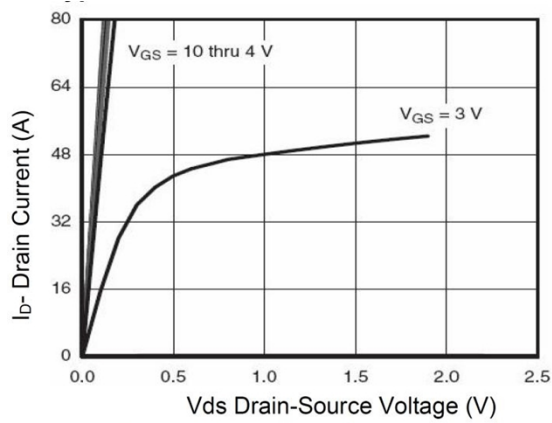


Figure 1 Output Characteristics

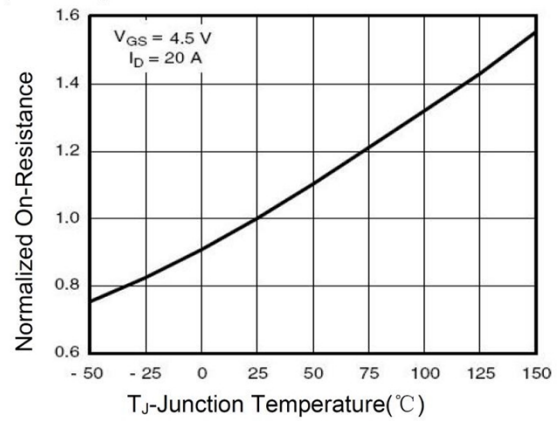


Figure 4 Rdson-Junction Temperature

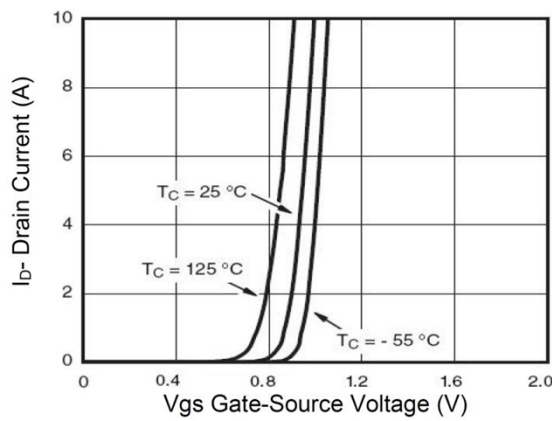


Figure 2 Transfer Characteristics

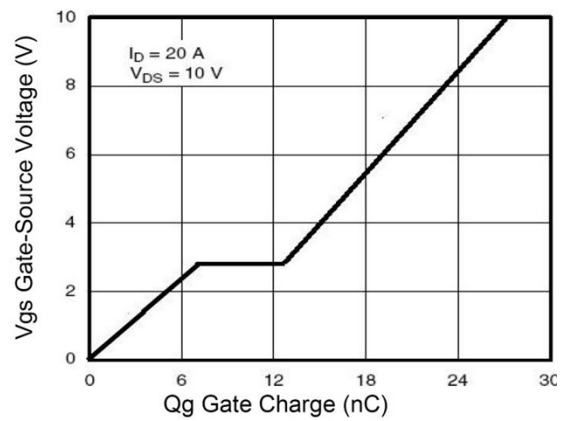


Figure 5 Gate Charge

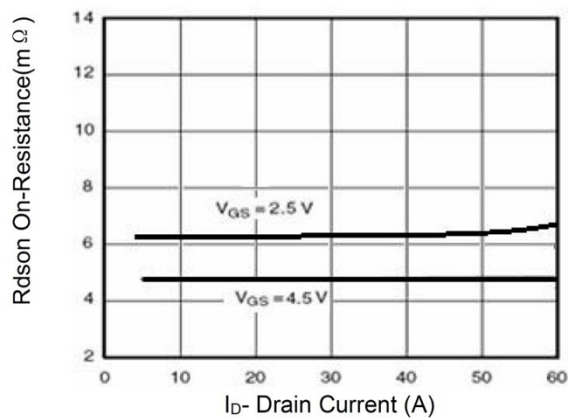


Figure 3 Rdson- Drain Current

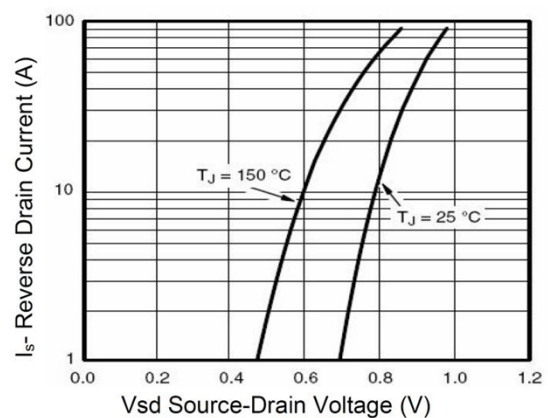


Figure 6 Source- Drain Diode Forward

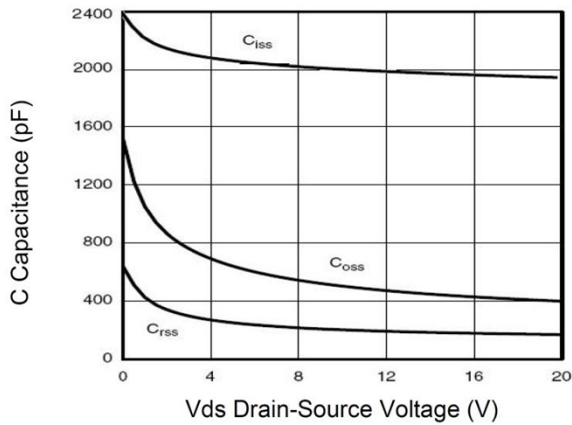


Figure 7 Capacitance vs Vds

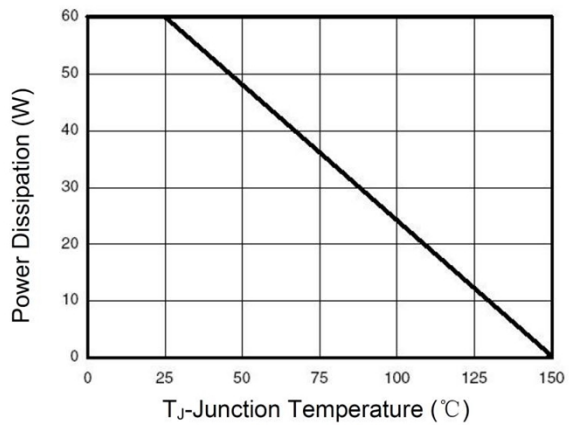


Figure 9 Power De-rating

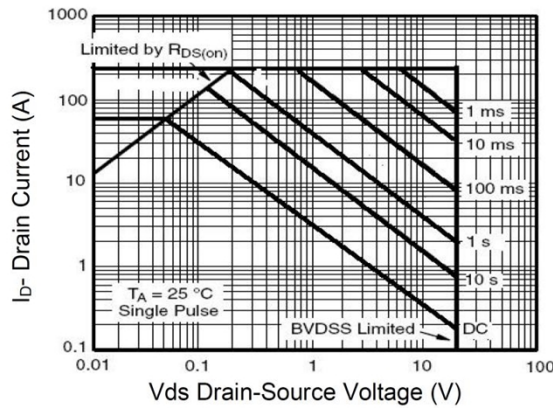


Figure 8 Safe Operation Area

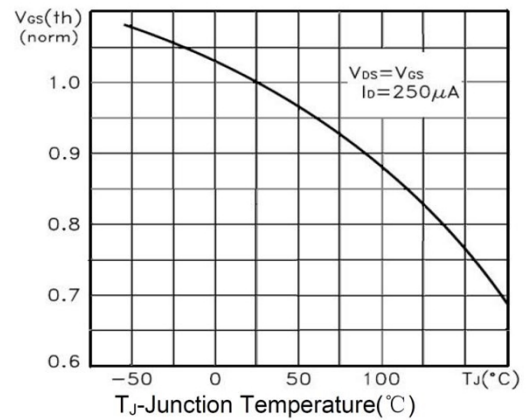


Figure 10 $V_{GS(th)}$ vs Junction Temperature

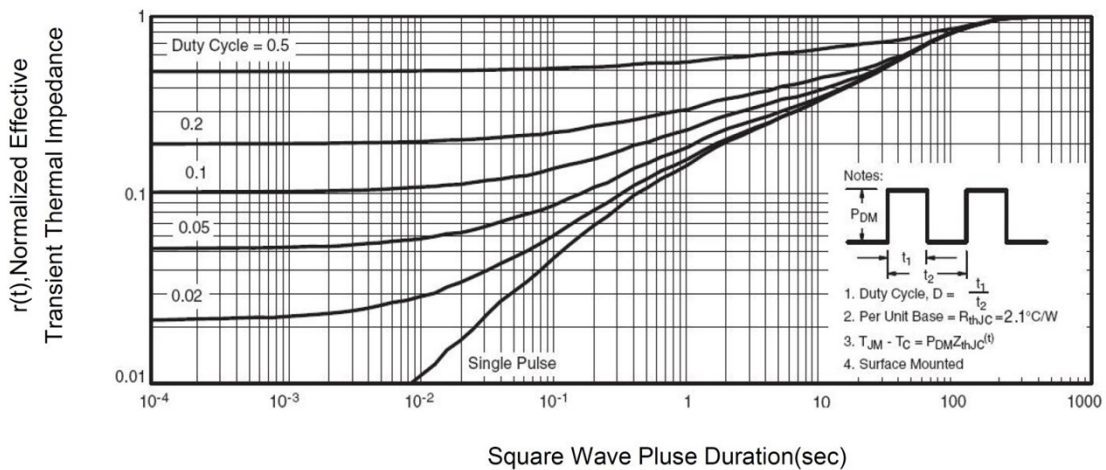
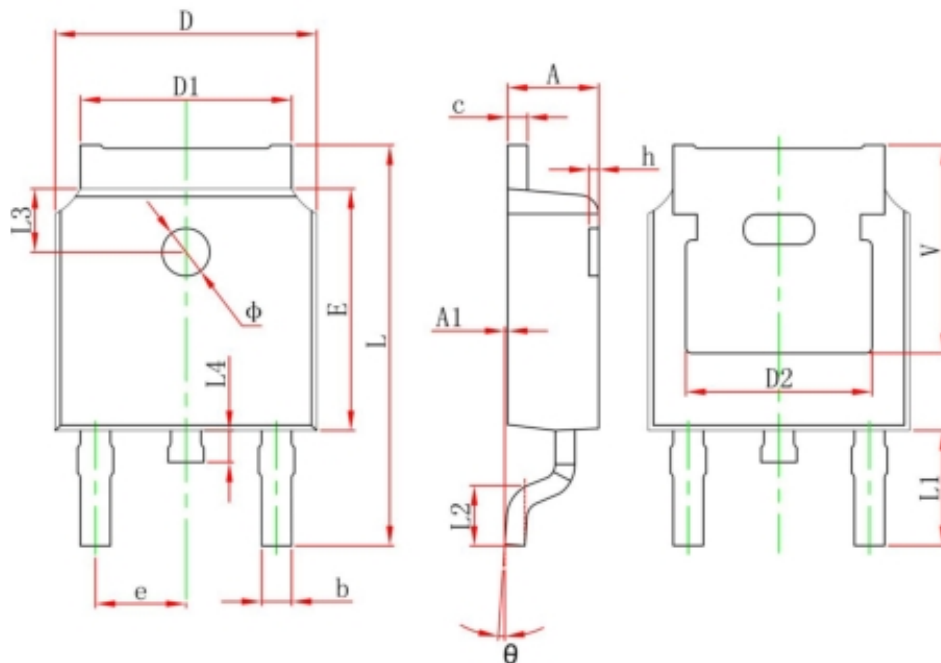


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 REF.		0.211 REF.	