BCD2050K

N-Channel Enhancement Mode MOSFET

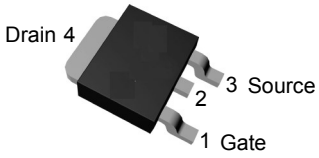
Features

- 20V/50A,
  $R_{DS(ON)}$= 12mΩ (Max.) @ V_{GS}=4.5V
  $R_{DS(ON)}$= 14.5mΩ (Max.) @ V_{GS}=2.5V
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

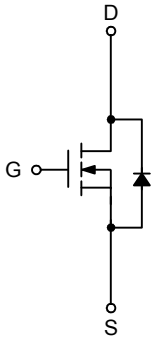
Applications

- Power Motor Controls.
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Industrial.
- Load Switching.

Pin Description



Top View of TO-252-2



N-Channel MOSFET

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Absolute Maximum Ratings (T_A = 25°C Unless Otherwise Noted)

Symbol	Parameter		Rating	Unit
Common Ratings				
V_{DSS}	Drain-Source Voltage		20	V
V_{GSS}	Gate-Source Voltage		±12	
T_J	Maximum Junction Temperature		150	°C
T_{STG}	Storage Temperature Range		-55 to 150	°C
I_S	Diode Continuous Forward Current	T_C=25°C	20	A
I_D	Continuous Drain Current	T_C=25°C	50*	A
		T_C=100°C	70	
I_{DM} [a]	Pulse Drain Current Tested	T_C=25°C	260	A
P_D	Maximum Power Dissipation	T_C=25°C	50	W
		T_C=100°C	20	
$R_{\theta JC}$	Thermal Resistance-Junction to Case	Steady State	2.5	°C/W
I_D	Continuous Drain Current	T_A=25°C	18	A
		T_A=70°C	15	
P_D	Maximum Power Dissipation	T_A=25°C	2.5	W
		T_A=70°C	1.6	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	t ≤ 10s	20	°C/W
		Steady State	50	
I_{AS} [b]	Avalanche Current, Single pulse	L=0.5mH	19	A
E_{AS} [b]	Avalanche Energy, Single pulse	L=0.5mH	212	mJ

Note a：*Current is limited by bond wire.

Note b：UIS tested and pulse width are limited by maximum junction temperature 150°C (initial temperature T_j=25°C).

Electrical Characteristics (T_A = 25°C Unless Otherwise Noted)

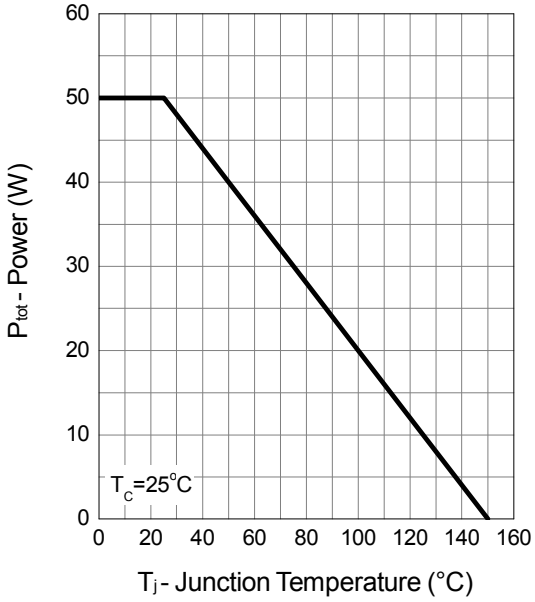
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_{DS}=250μA	20	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V	-	-	1	μA
		T_J=85°C	-	-	30	
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_{DS}=250μA	0.5	0.75	1	V
I_{GSS}	Gate Leakage Current	V_{GS}=±12V, V_{DS}=0V	-	-	±100	nA
$R_{DS(ON)}$ [c]	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=50A	-	7.2	8	mΩ
		T_J=125°C	-	6.9	-	
		V_{GS}=4.5V, I_{DS}=50A	-	9.0	12	
		V_{GS}=2.5V, I_{DS}=40A	-	11	14.5	
Diode Characteristics						
V_{SD} [c]	Diode Forward Voltage	I_{SD}=10A, V_{GS}=0V	-	0.7	1.1	V
t_{rr}	Reverse Recovery Time	I_{DS}=20A, dI_{SD}/dt=100A/μs	-	16	-	ns
t_a	Charge Time		-	9.2	-	
t_b	Discharge Time		-	7	-	
Q_{rr}	Reverse Recovery Charge		-	7.5	-	nC
Dynamic Characteristics [d]						
R_G	Gate Resistance	V_{GS}=0V,V_{DS}=0V,F=1MHz	-	1.5	2.7	Ω
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=10V, Frequency=1.0MHz	-	780	1015	pF
C_{oss}	Output Capacitance		-	170	-	
C_{rss}	Reverse Transfer Capacitance		-	120	-	
$t_{d(ON)}$	Turn-on Delay Time	V_{DD}=10V, R_L=10Ω, I_{DS}=1A, V_{GEN}=4.5V, R_G=1Ω	-	10.6	-	ns
t_r	Turn-on Rise Time		-	15	-	
$t_{d(OFF)}$	Turn-off Delay Time		-	17.2	-	
t_f	Turn-off Fall Time		-	4	-	
Gate Charge Characteristics [d]						
Q_g	Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=50A	-	8.9	11.5	nC
Q_g	Total Gate Charge	V_{DS}=10V, V_{GS}=4.5V, I_{DS}=50A	-	50	-	
Q_{gth}	Threshold Gate Charge		-	1.25	-	
Q_{gs}	Gate-Source Charge		-	0.52	-	
Q_{gd}	Gate-Drain Charge		-	3.8	-	

Note c：Pulse test ; pulse width≤300μs, duty cycle≤2%.

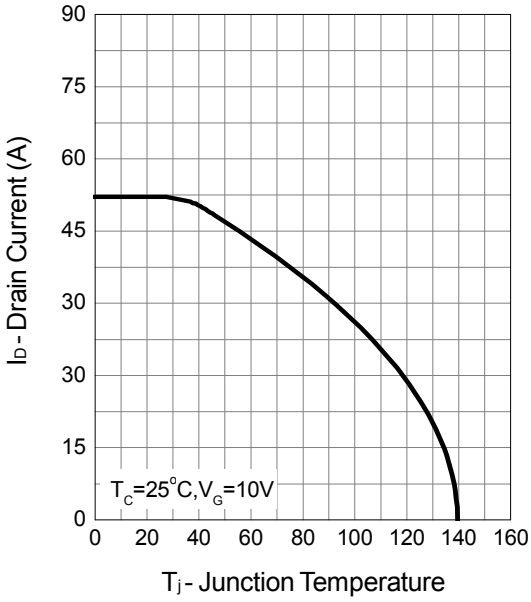
Note d：Guaranteed by design, not subject to production testing.

Typical Operating Characteristics

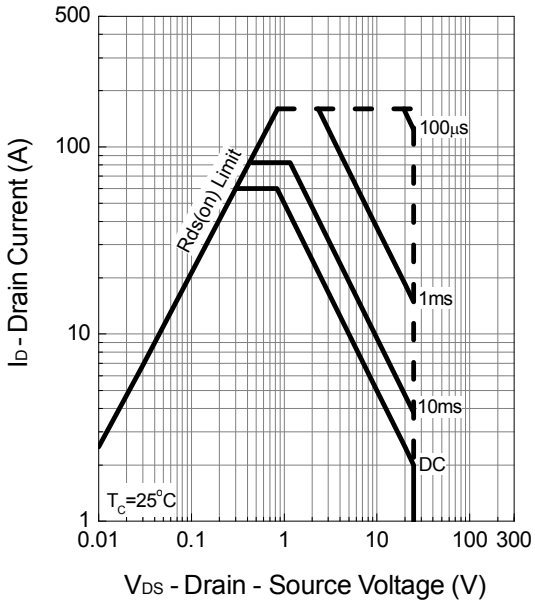
Power Dissipation



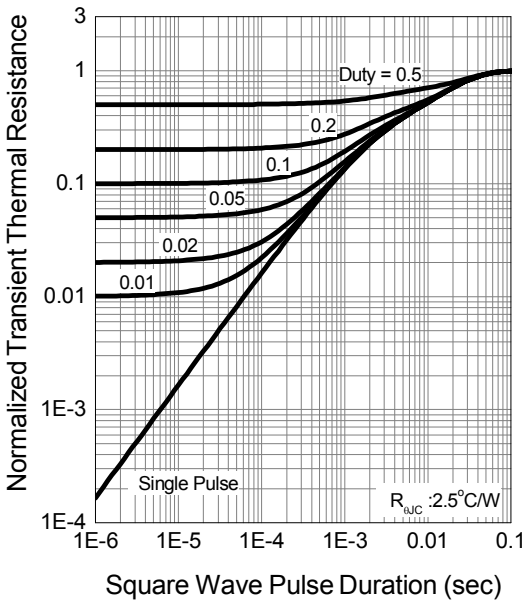
Drain Current



Safe Operation Area

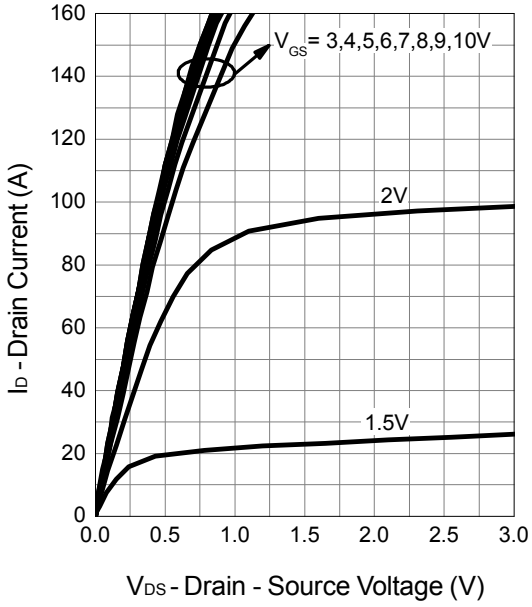


Thermal Transient Impedance

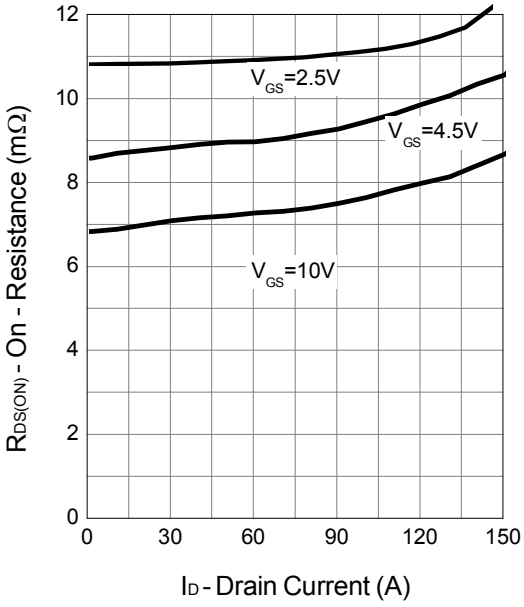


Typical Operating Characteristics (Cont.)

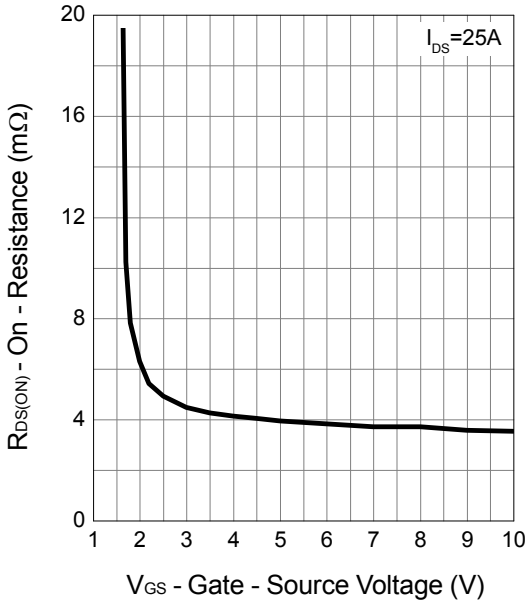
Output Characteristics



Drain-Source On Resistance



Gate-Source On Resistance



Gate Threshold Voltage