

BUK541-60A-VB Datasheet N-Channel 60 V(D-S) MOSFET

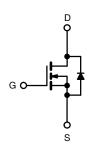
PRODUCT SUMMARY				
V _{DS} (V)	60			
R _{DS(on)} (Ω)	V _{GS} = 10 V 0.072			
Q _g max. (nC)	25			
Q _{gs} (nC)	5.8			
Q _{gd} (nC)	11			
Configuration	Single			

FEATURES

- Dynamic dV/dt rating
- Fast switching
- Ease of paralleling Simple drive requirements







N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _C = 25 °C, unless otherwise noted)						
PARAMETER			SYMBOL	LIMIT	UNIT	
Drain-Source Voltage			V_{DS}	60	V	
Gate-Source Voltage			V_{GS}	± 20	V	
Continuous Drain Current	V _{GS} at 10 V	T _C = 25 °C	= 25 °C 100 °C	20		
Continuous Drain Current	V _{GS} at 10 V	T _C = 100 °C		12	Α	
Pulsed Drain Current ^a			I _{DM}	68		
Linear Derating Factor				0.40	W/°C	
Single Pulse Avalanche Energy ^b			E _{AS}	100	mJ	
Maximum Power Dissipation $T_C = 25 ^{\circ}C$			P_{D}	60	W	
Peak Diode Recovery dV/dt c			dV/dt	4.5	V/ns	
Operating Junction and Storage Temperature Range			T _J , T _{stg}	-55 to +175	- °C	
Soldering Recommendations (Peak temperature) ^d	for 10 s			300		
Mounting Torque	6-32 or M3 screw			10	lbf ⋅ in	
Mounting Torque				1.1	N · m	

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. $V_{DD} = 25 \text{ V}$, starting $T_J = 25 \,^{\circ}\text{C}$, $L = 403 \,\mu\text{H}$, $R_g = 25 \,\Omega$, $I_{AS} = 17 \,\text{A}$ (see fig. 12).
- c. $I_{SD} \le 17$ A, $dI/dt \le 140$ A/ μ s, $V_{DD} \le V_{DS}$, $T_J \le 175$ °C.
- d. 1.6 mm from case.

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THERMAL RESISTANCE RATINGS					
PARAMETER	SYMBOL	TYP.	MAX.	UNIT	
Maximum Junction-to-Ambient	R _{thJA}	-	62		
Case-to-Sink, Flat, Greased Surface	R _{thCS}	0.50	-	°C/W	
Maximum Junction-to-Case (Drain)	R _{thJC}	-	2.5		

PARAMETER	SYMBOL	TES	MIN.	TYP.	MAX.	UNIT	
Static		1		<u> </u>			
Drain-Source Breakdown Voltage	V _{DS}	V _{GS} = 0 V, I _D = 250 μA		60	-	-	V
V _{DS} Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Reference	e to 25 °C, I _D = 1 mA	-	0.061	-	V/°C
Gate-Source Threshold Voltage	V _{GS(th)}	V _{DS} =	· V _{GS} , I _D = 250 μA	1.0	-	3.0	V
Gate-Source Leakage	I _{GSS}		V _{GS} = ± 20 V		-	± 100	nA
Zero Gate Voltage Drain Current	I _{DSS}		= 60 V, V _{GS} = 0 V , V _{GS} = 0 V, T _J = 150 °C	-	-	25 250	μA
Drain-Source On-State Resistance	R _{DS(on)}	V _{GS} = 10 V	I _D = 10 A ^b	-	0.072	-	Ω
Forward Transconductance	9 _{fs}	V_{DS}	= 25 V, I _D = 10 A	5.5	-	-	S
Dynamic							
Input Capacitance	C _{iss}		V _{GS} = 0 V,	-	640	-	pF
Output Capacitance	Coss	1	$V_{DS} = 25 \text{ V},$	-	360	-	
Reverse Transfer Capacitance	C _{rss}	f = 1	0 MHz, see fig. 5	-	79	-	
Total Gate Charge	Qg			-	-	25	
Gate-Source Charge	Q _{gs}	V _{GS} = 10 V	$I_D = 17 \text{ A}, V_{DS} = 48 \text{ V},$ see fig. 6 and 13 b	-	-	5.8	nC
Gate-Drain Charge	Q _{gd}	1	See lig. 6 dilla 16		-	11	
Turn-On Delay Time	t _{d(on)}			-	13	-	
Rise Time	t _r	V_{DD} = 30 V, I_{D} = 17 A, R_{g} = 18 Ω , R_{D} = 1.7 Ω , see fig. 10 ^b		-	58	-	- ns
Turn-Off Delay Time	t _{d(off)}			-	25	-	
Fall Time	t _f			-	42		
Internal Drain Inductance	L _D	6 mm (0.25")	Between lead, 6 mm (0.25") from		4.5	-	-11
Internal Source Inductance	L _S	package and center of die contact		-	7.5	-	nH
Drain-Source Body Diode Characteristic	s				•	I.	
Continuous Source-Drain Diode Current	I _S	MOSFET symbol showing the integral reverse p - n junction diode		-	-	20	Α
Pulsed Diode Forward Current ^a	I _{SM}			-	-	68	A
Body Diode Voltage	V _{SD}	T _J = 25 °C, I _S = 17 A, V _{GS} = 0 V ^b		-	-	1.5	V
Body Diode Reverse Recovery Time	t _{rr}	$T_J = 25 ^{\circ}\text{C}$, $I_F = 17 \text{A}$, $dI/dt = 100 \text{A/}\mu\text{s}$		-	88	180	ns
Body Diode Reverse Recovery Charge	Q _{rr}			-	0.29	0.64	μC
Forward Turn-On Time	t _{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L _S and L _D)					L _D)

Notes

- a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).
- b. Pulse width $\leq 300~\mu s$; duty cycle $\leq 2~\%$.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

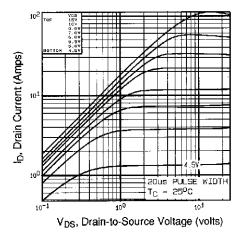


Fig. 1 - Typical Output Characteristics, T_C = 25 °C

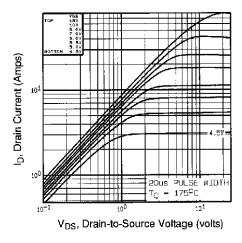


Fig. 2 - Typical Output Characteristics, $T_C = 175$ °C

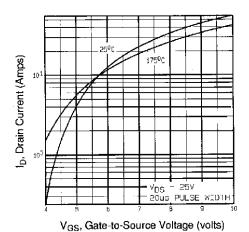


Fig. 3 - Typical Transfer Characteristics

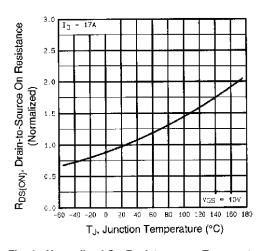


Fig. 4 - Normalized On-Resistance vs. Temperature

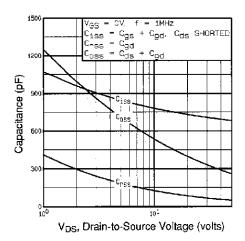


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

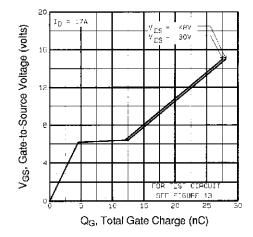


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



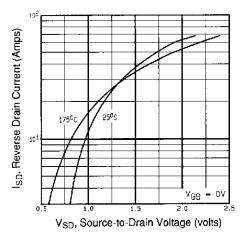


Fig. 7 - Typical Source-Drain Diode Forward Voltage

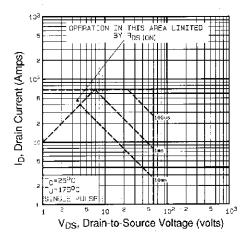


Fig. 8 - Maximum Safe Operating Area

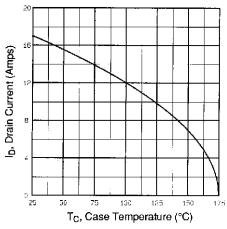


Fig. 9 - Maximum Drain Current vs. Case Temperature

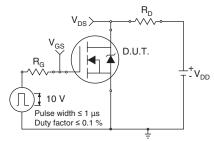


Fig. 10a - Switching Time Test Circuit

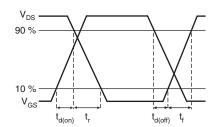


Fig. 10b - Switching Time Waveforms

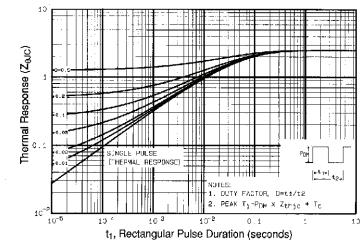
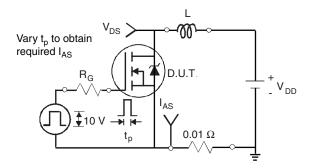


Fig. 11 - Maximum Effective Transient Thermal Impedance, Junction-to-Case





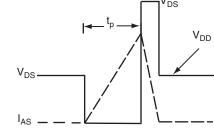


Fig. 12a - Unclamped Inductive Test Circuit

Fig. 12b - Unclamped Inductive Waveforms

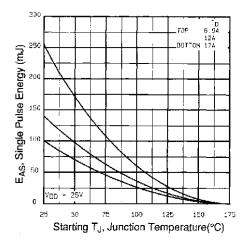


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

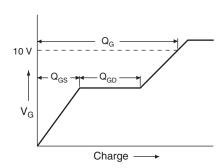


Fig. 13a - Basic Gate Charge Waveform

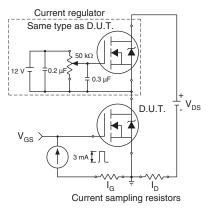
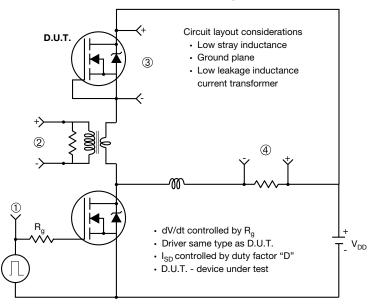


Fig. 13b - Gate Charge Test



Peak Diode Recovery dV/dt Test Circuit



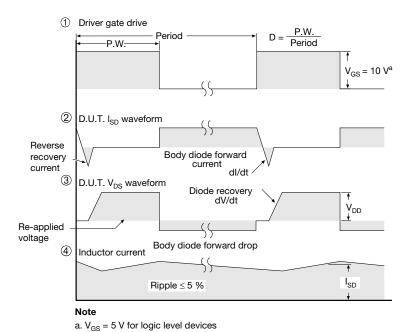
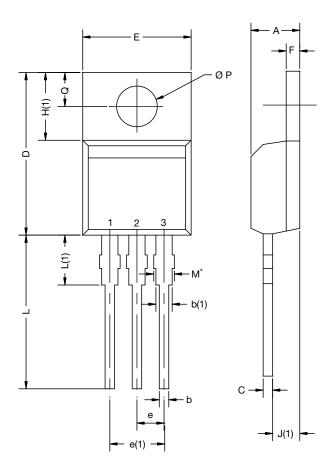


Fig. 14 - For N-Channel



TO-220



DIM	MILLIN	IETERS	INCHES		
DIM.	MIN.	MAX.	MIN.	MAX.	
А	4.24	4.65	0.167	0.183	
b	0.69	1.02	0.027	0.040	
b(1)	1.14	1.78	0.045	0.070	
С	0.36	0.61	0.014	0.024	
D	14.33	15.85	0.564	0.624	
Е	9.96	10.52	0.392	0.414	
е	2.41	2.67	0.095	0.105	
e(1)	4.88	5.28	0.192	0.208	
F	1.14	1.40	0.045	0.055	
H(1)	6.10	6.71	0.240	0.264	
J(1)	2.41	2.92	0.095	0.115	
L	13.36	14.40	0.526	0.567	
L(1)	3.33	4.04	0.131	0.159	
ØΡ	3.53	3.94	0.139	0.155	
Q	2.54	3.00	0.100	0.118	
ECN: X15-0364-Rev. C, 14-Dec-15 DWG: 6031					

Note

 $\bullet~M^{\star}=0.052$ inches to 0.064 inches (dimension including protrusion), heatsink hole for HVM

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