

## BUK542-60B-VB Datasheet N-Channel 60 V(D-S) MOSFET

PRODUCT SUMMARY					
V <sub>DS</sub> (V)	60				
R <sub>DS(on)</sub> (Ω)	V <sub>GS</sub> = 10 V 0.072				
Q <sub>g</sub> max. (nC)	25				
Q <sub>gs</sub> (nC)	5.8				
Q <sub>gd</sub> (nC)	11				
Configuration	Sing	le			

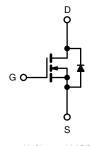
## FEATURES

- Dynamic dV/dt rating
- · Fast switching
- Ease of paralleling

Simple drive requirements







N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T <sub>C</sub>	= 25 °C, unl	ess otherwis	se noted)			
PARAMETER		SYMBOL	LIMIT	UNIT		
Drain-Source Voltage		V <sub>DS</sub>	60	V		
Gate-Source Voltage			V <sub>GS</sub>	± 20	V	
Continuous Drain Current	V at 10 V	$T_{\rm C} = 25 \ ^{\circ}{\rm C}$ $T_{\rm C} = 100 \ ^{\circ}{\rm C}$	۱ <sub>D</sub>	20		
	V <sub>GS</sub> at 10 V	T <sub>C</sub> = 100 °C		12	А	
Pulsed Drain Current <sup>a</sup>			I <sub>DM</sub>	68		
Linear Derating Factor				0.40	W/°C	
Single Pulse Avalanche Energy <sup>b</sup>			E <sub>AS</sub>	100	mJ	
Maximum Power Dissipation	T <sub>C</sub> = 25 °C		PD	60	W	
Peak Diode Recovery dV/dt c		dV/dt	4.5	V/ns		
erating Junction and Storage Temperature Range T <sub>J</sub> , T <sub>stg</sub> -55 to +1		-55 to +175	°C			
Soldering Recommendations (Peak temperature) <sup>d</sup>	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  $T_J = 25 \text{ °C}$ , L = 403 µH,  $R_g = 25 \Omega$ ,  $I_{AS} = 17 \text{ A}$  (see fig. 12).
- c.  $I_{SD} \le 17$  A, dl/dt  $\le 140$  A/µs,  $V_{DD} \le V_{DS}$ ,  $T_J \le 175$  °C.

d. 1.6 mm from case.

## BUK542-60B-VB



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

PARAMETER	SYMBOL	TES	T CONDITIONS	MIN.	TYP.	MAX.	UNIT
Static							
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> =	= 0 V, I <sub>D</sub> = 250 μA	60	-	-	V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	Referenc	e to 25 °C, I <sub>D</sub> = 1 mA	-	0.061	-	V/°C
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =	= V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1.0	-	3.0	V
Gate-Source Leakage	I <sub>GSS</sub>		$V_{GS} = \pm 20 V$	-	-	± 100	nA
		$V_{DS} = 60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$		-	-	25	
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 48 V,	$V_{GS} = 0 V, T_J = 150 \ ^{\circ}C$	-	-	250	μA
Drain-Source On-State Resistance	R <sub>DS(on)</sub>	$V_{GS} = 10 V$	I <sub>D</sub> = 10 A <sup>b</sup>	-	0.072	-	Ω
Forward Transconductance	<b>g</b> <sub>fs</sub>	V <sub>DS</sub>	= 25 V, I <sub>D</sub> = 10 A	5.5	-	-	S
Dynamic							
Input Capacitance	C <sub>iss</sub>	$V_{GS} = 0 V,$		-	640	-	pF
Output Capacitance	C <sub>oss</sub>		$V_{DS} = 25 V,$		360	-	
Reverse Transfer Capacitance	C <sub>rss</sub>	f = 1.0 MHz, see fig. 5		-	79	-	
Total Gate Charge	Qg		I <sub>D</sub> = 17 A, V <sub>DS</sub> = 48 V, see fig. 6 and 13 <sup>b</sup>	-	-	25	nC
Gate-Source Charge	$Q_gs$	$V_{GS} = 10 V$		-	-	5.8	
Gate-Drain Charge	Q <sub>gd</sub>		<b>J</b>	-	-	11	
Turn-On Delay Time	t <sub>d(on)</sub>			-	13	-	
Rise Time	t <sub>r</sub>	$V_{DD}$ = 30 V, $I_D$ = 17 A, $R_g$ = 18 $\Omega,R_D$ = 1.7 $\Omega,see$ fig. 10 $^b$		-	58	-	ns
Turn-Off Delay Time	t <sub>d(off)</sub>			-	25	-	
Fall Time	t <sub>f</sub>			-	42	-	
Internal Drain Inductance	L <sub>D</sub>	6 mm (0.25") f	Between lead, 6 mm (0.25") from		4.5	-	
Internal Source Inductance	L <sub>S</sub>	die contact		-	7.5	-	nH
Drain-Source Body Diode Characteristic	s	•				•	
Continuous Source-Drain Diode Current	I <sub>S</sub>	MOSFET symbol showing the		-	-	20	Α
Pulsed Diode Forward Current <sup>a</sup>	I <sub>SM</sub>	integral revers p - n junction		-	-	68	
Body Diode Voltage	V <sub>SD</sub>	T <sub>J</sub> = 25 °C	, $I_{\rm S}$ = 17 A, $V_{\rm GS}$ = 0 V <sup>b</sup>	-	-	1.5	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>	T 05 °C 1	17 A dl/dt 100 A / -	-	88	180	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	$T_J = 25 \text{ °C}, I_F = 17 \text{ A}, dI/dt = 100 \text{ A}/\mu\text{s}$		-	0.29	0.64	μC
Forward Turn-On Time	t <sub>on</sub>	Intrinsic tu	-on is doi	minated b	y L <sub>S</sub> and	L <sub>D</sub> )	

#### Notes

a. Repetitive rating; pulse width limited by maximum junction temperature (see fig. 11).

b. Pulse width  $\leq$  300 µs; duty cycle  $\leq$  2 %.



### TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

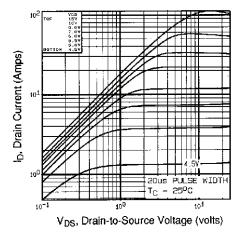


Fig. 1 - Typical Output Characteristics, T<sub>C</sub> = 25 °C

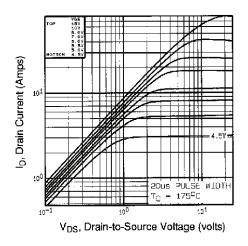


Fig. 2 - Typical Output Characteristics, T<sub>C</sub> = 175 °C

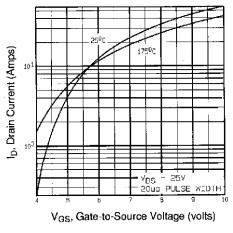


Fig. 3 - Typical Transfer Characteristics

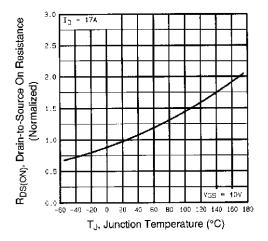


Fig. 4 - Normalized On-Resistance vs. Temperature

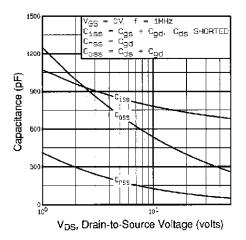


Fig. 5 - Typical Capacitance vs. Drain-to-Source Voltage

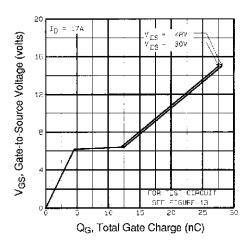


Fig. 6 - Typical Gate Charge vs. Gate-to-Source Voltage



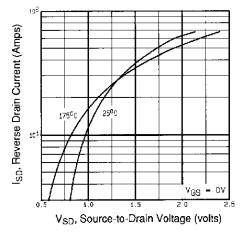


Fig. 7 - Typical Source-Drain Diode Forward Voltage

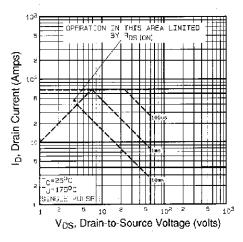


Fig. 8 - Maximum Safe Operating Area

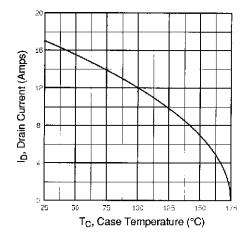


Fig. 9 - Maximum Drain Current vs. Case Temperature

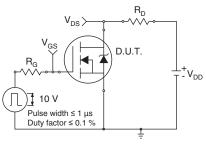


Fig. 10a - Switching Time Test Circuit

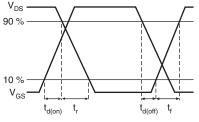
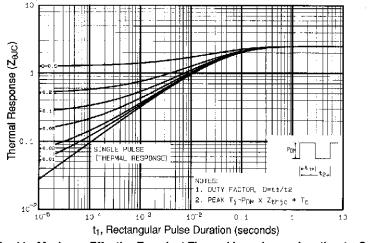


Fig. 10b - Switching Time Waveforms







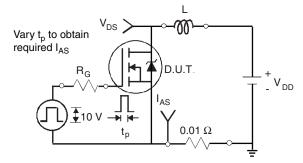


Fig. 12a - Unclamped Inductive Test Circuit

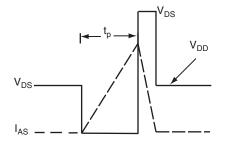


Fig. 12b - Unclamped Inductive Waveforms

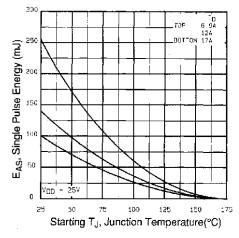


Fig. 12c - Maximum Avalanche Energy vs. Drain Current

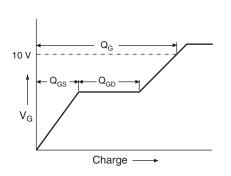


Fig. 13a - Basic Gate Charge Waveform

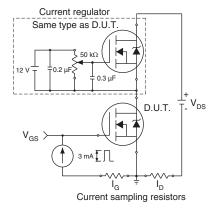
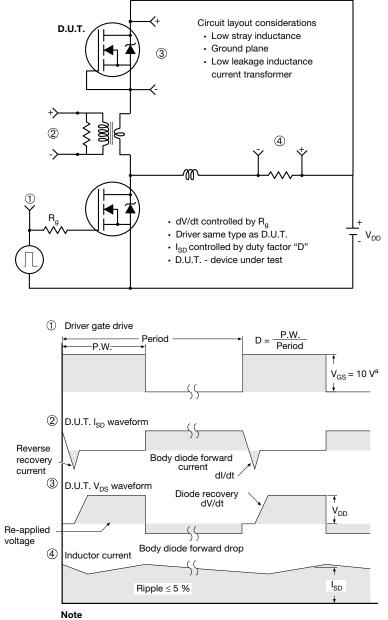


Fig. 13b - Gate Charge Test



Peak Diode Recovery dV/dt Test Circuit

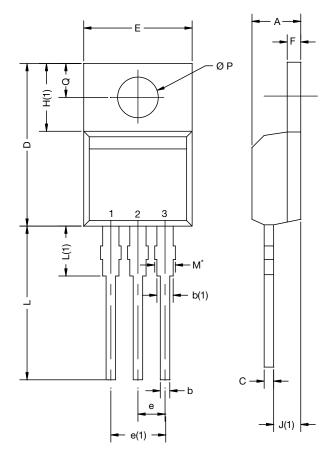


a.  $V_{GS} = 5 V$  for logic level devices

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	
E	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- DWG: 603	0364-Rev. C, 1	14-Dec-15			

Note

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



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