

## SI3433BDV-T1-GE3-VB Datasheet P-Channel 30-V (D-S) MOSFET

PRODUCT SUMMARY						
V <sub>DS</sub> (V)	$R_{DS(on)}\left(\Omega\right)$	I <sub>D</sub> (A) <sup>a</sup>	Q <sub>g</sub> (Typ.)			
- 30	0.049 at V <sub>GS</sub> = - 10 V	- 4.8	5.1 nC			
	0.054 at V <sub>GS</sub> = - 4.5 V	- 4.1	5.1110			

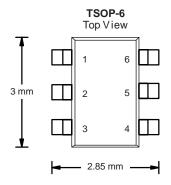
#### **FEATURES**

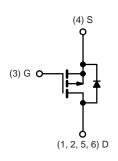
- Halogen-free According to IEC 61249-2-21 **Available**
- Trench Power MOSFET

### COMPLIANT HALOGEN FREE

#### **APPLICATIONS**

· Load Switch





P-Channel MOSFET

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	- 30	V	
Gate-Source Voltage		$V_{GS}$	± 20	V
	T <sub>C</sub> = 25 °C		- 4.8	
Continuous Drain Current (T <sub>.1</sub> = 150 °C)	T <sub>C</sub> = 70 °C	l .	- 4.1	
Continuous Diam Current (1) = 130 °C)	T <sub>A</sub> = 25 °C	I <sub>D</sub>	- 4.0 <sup>b, c</sup>	
	T <sub>A</sub> = 70 °C	Ī	- 3.5 <sup>b, c</sup>	A
Pulsed Drain Current		I <sub>DM</sub>	- 20	
	T <sub>C</sub> = 25 °C		- 2.5	
Continuous Source-Drain Diode Current	T <sub>A</sub> = 25 °C	I <sub>S</sub>	- 1.67 <sup>b, c</sup>	
	T <sub>C</sub> = 25 °C		3.0	
Maximum Dawar Dissination	T <sub>C</sub> = 70 °C	D.	2.0	w
Maximum Power Dissipation	T <sub>A</sub> = 25 °C	- P <sub>D</sub>	2.0 <sup>b, c</sup>	VV
	T <sub>A</sub> = 70 °C	<b>†</b>	1.3 <sup>b, c</sup>	
Operating Junction and Storage Temperature	T <sub>J</sub> , T <sub>stq</sub>	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS							
Parameter	Symbol	Typical	Maximum	Unit			
Maximum Junction-to-Ambient <sup>b, d</sup>	t ≤ 5 s	$R_{thJA}$	55	62.5	°C/W		
Maximum Junction-to-Foot (Drain)	Steady State	$R_{thJF}$	34	41	C/ V V		

#### Notes:

- a. Based on T<sub>C</sub> = 25 °C.
  b. Surface Mounted on 1" x 1" FR4 board.
- c. t = 5 s.
- d. Maximum under Steady State conditions is 110 °C/W.

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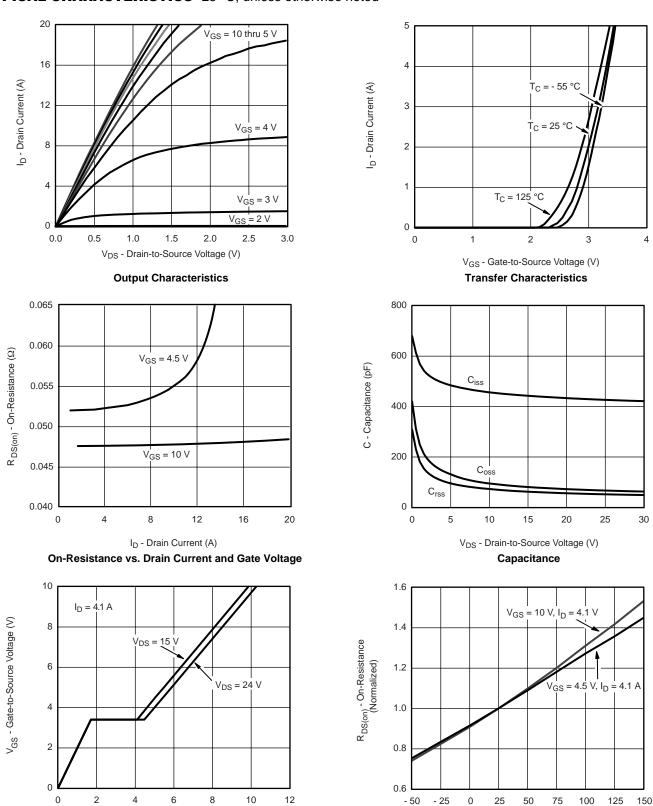


Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Static	· ·				L	
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = - 250 μA				V
V <sub>DS</sub> Temperature Coefficient	$\Delta V_{DS}/T_{J}$	J 250 A		- 31		mV/°C
V <sub>GS(th)</sub> Temperature Coefficient	$\Delta V_{GS(th)}/T_J$	I <sub>D</sub> = - 250 μA		4.5		
Gate-Source Threshold Voltage	V <sub>GS(th)</sub>	$V_{DS} = V_{GS}, I_{D} = -250 \mu A$	- 0.5		- 2.0	V
Gate-Source Leakage	I <sub>GSS</sub>	$V_{DS} = 0 \text{ V}, V_{GS} = \pm 20 \text{ V}$			± 100	nA
Zana Oata Valtana Bua'a Oamaat	1	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$			- 1	μΑ
Zero Gate Voltage Drain Current	IDSS	V <sub>DS</sub> = - 30 V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 55 °C			- 10	
On-State Drain Current <sup>a</sup>	I <sub>D(on)</sub>	$V_{DS} \le -5 \text{ V}, V_{GS} = -10 \text{ V}$	- 20			Α
		V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 4.1 A		0.049		Ω
Drain-Source On-State Resistance <sup>a</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = - 4.5 V, I <sub>D</sub> = - 1.0 A		0.054		
Forward Transconductance <sup>a</sup>	9 <sub>fs</sub>	V <sub>DS</sub> = - 15 V, I <sub>D</sub> = - 4.1 A		8		S
Dynamic <sup>b</sup>					L	
Input Capacitance	C <sub>iss</sub>			450		pF
Output Capacitance	C <sub>oss</sub>	$V_{DS} = -15 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$		80		
Reverse Transfer Capacitance	C <sub>rss</sub>			63		
Total Cata Channa	Qg	V <sub>DS</sub> = - 15 V, V <sub>GS</sub> = - 10 V, I <sub>D</sub> = - 4.1 A		10	15	nC
Total Gate Charge				5.1	8	
Gate-Source Charge	$Q_{gs}$	$V_{DS} = -15 \text{ V}, V_{GS} = -4.5 \text{ V}, I_{D} = -4.1 \text{ A}$		1.8		
Gate-Drain Charge	$Q_{gd}$			2.5		
Gate Resistance	$R_{g}$	f = 1 MHz				Ω
Turn-On Delay Time	t <sub>d(on)</sub>			40	60	ns
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 15 V, $R_L$ = 4.6 $\Omega$		80	120	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 3.3 A, $V_{GEN}$ = - 4.5 V, $R_g$ = 1 $\Omega$		20	30	
Fall Time	t <sub>f</sub>			12	20	
Turn-On Delay Time	t <sub>d(on)</sub>			5	10	
Rise Time	t <sub>r</sub>	$V_{DD}$ = - 15 V, $R_L$ = 4.6 $\Omega$		13	20	
Turn-Off Delay Time	t <sub>d(off)</sub>	$I_D \cong$ - 3.3 A, $V_{GEN}$ = - 10 V, $R_g$ = 1 $\Omega$		20	30	
Fall Time	t <sub>f</sub>			10	15	
<b>Drain-Source Body Diode Characteristi</b>	cs					
Continuous Source-Drain Diode Current	I <sub>S</sub>	T <sub>C</sub> = 25 °C			- 2.5	^
Pulse Diode Forward Current <sup>a</sup>	I <sub>SM</sub>				- 20	A
Body Diode Voltage	V <sub>SD</sub>	I <sub>S</sub> = - 3.3 A		- 0.8	- 1.2	V
Body Diode Reverse Recovery Time	t <sub>rr</sub>			20	30	ns
Body Diode Reverse Recovery Charge	Q <sub>rr</sub>	I <sub>F</sub> = - 3.3 A, di/dt = 100 A/μs, T <sub>.1</sub> = 25 °C		20	30	nC
Reverse Recovery Fall Time	t <sub>a</sub>	$_{1F} = -3.3 \text{ A}, \text{ al/at} = 100 \text{ A/}\mu\text{s},  \text{I}_{\text{J}} = 25 ^{\circ}\text{C}$		14		
Reverse Recovery Rise Time	t <sub>b</sub>			6		ns

- a. Pulse test; pulse width  $\leq$  300 µs, duty cycle  $\leq$  2 % b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.





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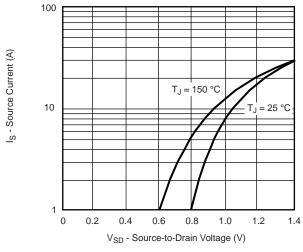
Q<sub>q</sub> - Total Gate Charge (nC)

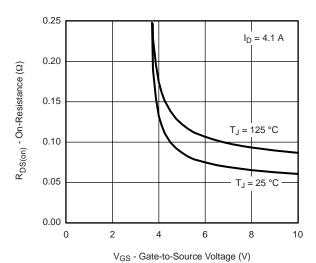
**Gate Charge** 

T<sub>J</sub> - Junction Temperature (°C)

On-Resistance vs. Junction Temperature

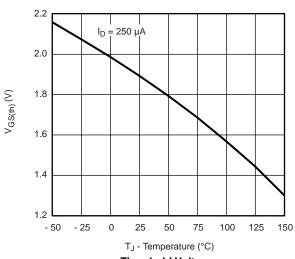


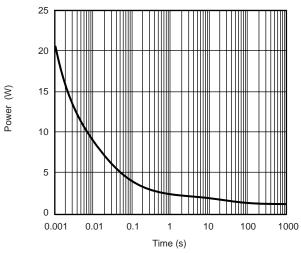




#### Source-Drain Diode Forward Voltage

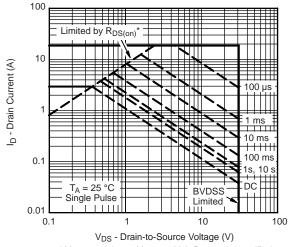






**Threshold Voltage** 

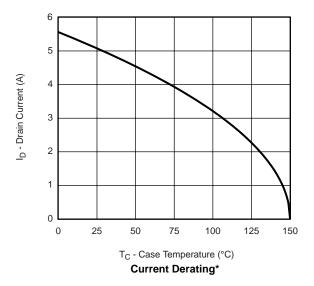
Single Pulse Power

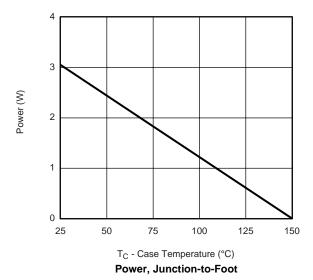


\*  $V_{GS}$  > minimum  $V_{GS}$  at which  $R_{DS(on)}$  is specified

Safe Operating Area

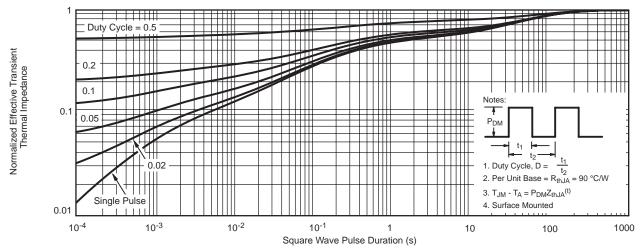




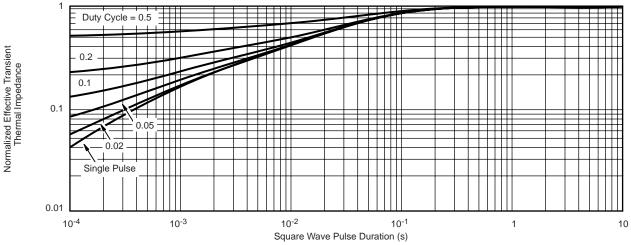


<sup>\*</sup> The power dissipation  $P_D$  is based on  $T_{J(max)} = 150$  °C, using junction-to-case thermal resistance, and is more useful in settling the upper dissipation limit for cases where additional heatsinking is used. It is used to determine the current rating, when this rating falls below the package limit.





Normalized Thermal Transient Impedance, Junction-to-Ambient

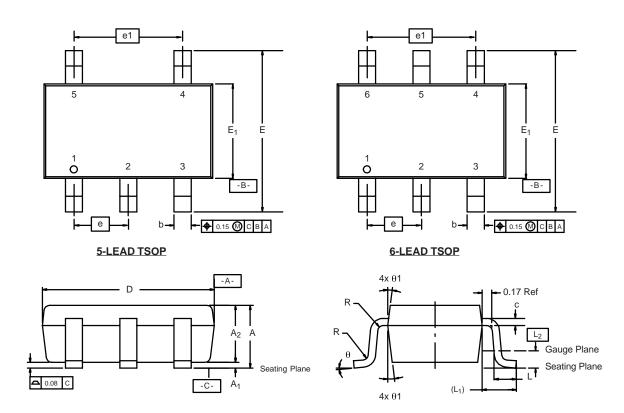


Normalized Thermal Transient Impedance, Junction-to-Foot



TSOP: 5/6-LEAD

**JEDEC Part Number: MO-193C** 

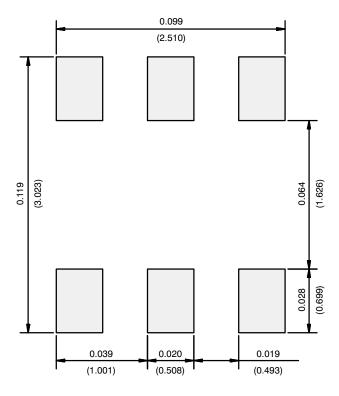


	MILLIMETERS			INCHES			
Dim	Min	Nom	Max	Min	Nom	Max	
Α	0.91	-	1.10	0.036	-	0.043	
A <sub>1</sub>	0.01	-	0.10	0.0004	-	0.004	
A <sub>2</sub>	0.90	-	1.00	0.035	0.038	0.039	
b	0.30	0.32	0.45	0.012	0.013	0.018	
С	0.10	0.15	0.20	0.004	0.006	0.008	
D	2.95	3.05	3.10	0.116	0.120	0.122	
E	2.70	2.85	2.98	0.106	0.112	0.117	
E <sub>1</sub>	1.55	1.65	1.70	0.061	0.065	0.067	
е		0.95 BSC		0.0374 BSC			
e <sub>1</sub>	1.80	1.90	2.00	0.071	0.075	0.079	
L	0.32	-	0.50	0.012	1	0.020	
L <sub>1</sub>	0.60 Ref			0.024 Ref			
L <sub>2</sub>	0.25 BSC			0.010 BSC			
R	0.10	-	-	0.004	-	-	
θ	0°	4°	8°	0°	4°	8°	
$\theta_1$	7° Nom			7° Nom			
ECN: C-06593-Rev. I, 18-Dec-06 DWG: 5540							

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### **RECOMMENDED MINIMUM PADS FOR TSOP-6**



Recommended Minimum Pads Dimensions in Inches/(mm)



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