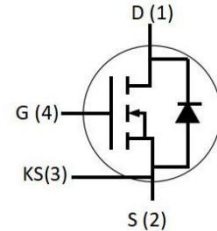


## SIC MOSFET

### Features

- High Blocking Voltage with Low On-Resistance
- Easy to Parallel and Simple to Drive
- High Speed Switching with Low Capacitances
- Avalanche Ruggednes
- Halogen Free, RoHS Compliant

$BV_{DSS}$	$R_{DS(ON),typ.}$	$I_D$
1200V	16mΩ	120A



TO-247-4

Package Not to Scale

### Applications

- Solar Inverters
- Switch Mode Power Supplies
- Automotive Applications
- Batttery Chargers

### Absolute Maximum Ratings

Symbol	Parameter	Maximum Rating	Unit
$V_{DSS}$	Drain-to-Source Voltage	1200	V
$V_{GSS}$	Gate-to-Source Operation Voltage	-5/+20	
$I_D$	Continuous Drain Current	120	A
	Continuous Drain Current @ $T_c=100^{\circ}C$	80	
$I_D$ pulse	Pulsed drain current ( $T_C=25^{\circ}C$ , tp limited by $T_{jmax}$ )	250	
$P_D$	Power Dissipation	430	W
$T_J$ & $T_{STG}$	Operating and Storage Temperature Range	-55 to 175	$^{\circ}C$

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

### Thermal Characteristics

Symbol	Parameter	Maximum Rating	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.35	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	35	

## Electrical Characteristics

### OFF Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	1200	--	--	V	$V_{GS}=0V, I_D=250\mu A$
$I_{DSS}$	Drain-to-Source Leakage Current	--	--	100	$\mu A$	$V_{DS}=1200V, V_{GS}=0V, T_c=25^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Leakage Current	--	10	200	nA	$V_{GS}=18V, V_{DS}=0V$
$I_{SGS}$	Gate-to-Source Leakage Current	--	-10	-200	nA	$V_{GS}=-8V, V_{DS}=0V$

### ON Characteristics $T_J=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	16	20	m $\Omega$	$V_{GS}=18V, I_D=60A, T_J=25^\circ\text{C}$
		--	30	--	m $\Omega$	$V_{GS}=18V, I_D=60A, T_J=175^\circ\text{C}$
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	2.8	4.0	V	$V_{DS}=V_{GS}, I_D=25mA, T_J=25^\circ\text{C}$
		--	2.0	--	V	$V_{DS}=V_{GS}, I_D=25mA, T_J=175^\circ\text{C}$
$g_{fs}$	Transconductance	--	50	--	S	$V_{DS}=20V, I_D=60A$
$R_G$	Gate resistance	--	2.4	--	$\Omega$	$V_{GS}=0V, V_{AC}=25mV, f=1.0MHz$

### Dynamic Characteristics Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$C_{iss}$	Input Capacitance	--	6145	--	pF	$V_{GS}=0V, V_{DS}=1000V, f=1.0MHz, V_{AC}=25mV$
$C_{rSS}$	Reverse Transfer Capacitance	--	11	--		
$C_{oss}$	Output Capacitance	--	230	--		
$Q_g$	Total Gate Charge	--	200	--	nC	$V_{DD}=800V, I_D=60A, V_{GS}=-5 \text{ to } +18V$
$Q_{gs}$	Gate-to-Source Charge	--	64	--		
$Q_{gd}$	Gate-to-Drain (Miller) Charge	--	80	--		

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	27	--	ns	$T_J=25^{\circ}\text{C}$ , $V_{GS}=-5/+18\text{V}$ , $I_D=50\text{A}$ , $V_{DS}=800\text{V}$ , $R_g=5\Omega$ , $L=200\mu\text{H}$
$t_r$	Rise Time	--	18	--		
$t_{d(OFF)}$	Turn-Off Delay Time	--	75	--		
$t_f$	Fall Time	--	46	--		

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$E_{ON}$	Turn-On Switching Energy	--	0.46	--	mJ	$T_J=25^{\circ}\text{C}$ , $V_{GS}=-5/+18\text{V}$ , $I_D=50\text{A}$ , $V_{DS}=800\text{V}$ , $R_g=5\Omega$ , $L=200\mu\text{H}$
$E_{OFF}$	Turn-Off Switching Energy	--	1.0	--		

**Source-Drain Body Diode Characteristics**

Symbol	Parameter	Min	Typ.	Max.	Unit	Test Conditions
$V_{SD}$	Diode Forward Voltage	--	3.2	--	V	$V_{GS}=-5\text{V}$ , $I_{SD}=30\text{A}$ , $T_J=25^{\circ}\text{C}$
		--	2.3	--		$V_{GS}=-5\text{V}$ , $I_{SD}=30\text{A}$ , $T_J=175^{\circ}\text{C}$
$t_{rr}$	Reverse recovery time	--	18.6	--	ns	$V_{GS}=-5/+18\text{V}$ , $I_{SD}=50\text{A}$ $V_R=800\text{V}$ , $T_J=25^{\circ}\text{C}$
$Q_{rr}$	Reverse recovery charge	--	130	--		
$I_{rrm}$	Peak Reverse Recovery Current	--	10.6	--		

## Typical Performance Characteristics

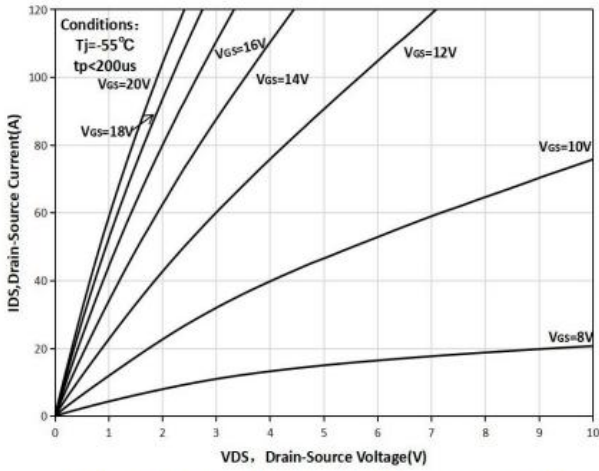


Figure 1. Output Characteristics T<sub>J</sub> = -55 °C

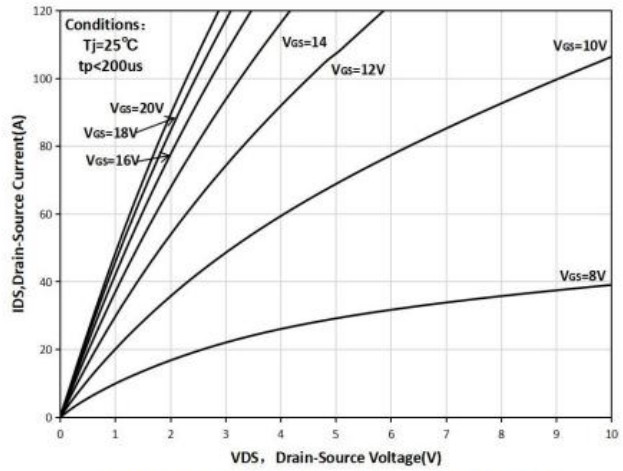


Figure 2. Output Characteristics T<sub>J</sub> = 25 °C

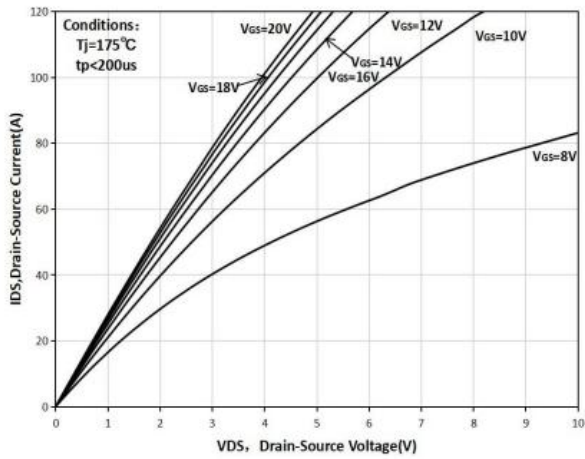


Figure 3. Output Characteristics T<sub>J</sub> = 175 °C

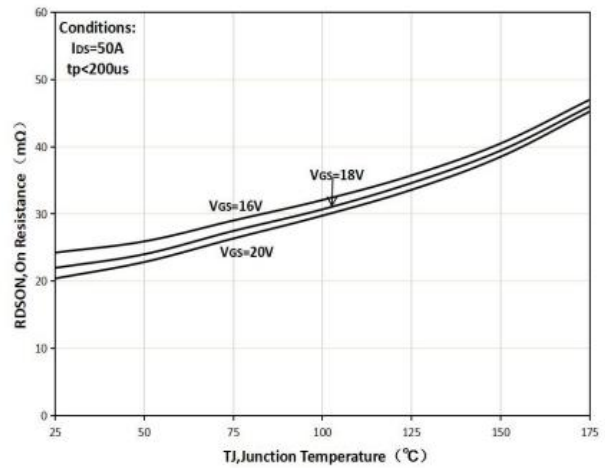


Figure 4. On-Resistance For Various Gate Voltage

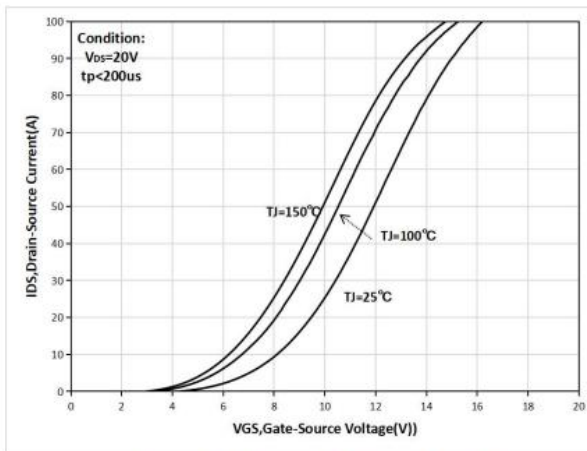


Figure 5. Transfer Characteristic for Various Junction Temperatures

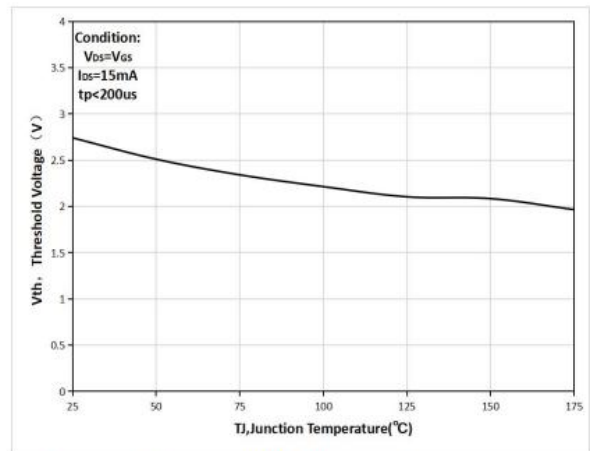


Figure 6. Threshold Voltage vs. Temperature

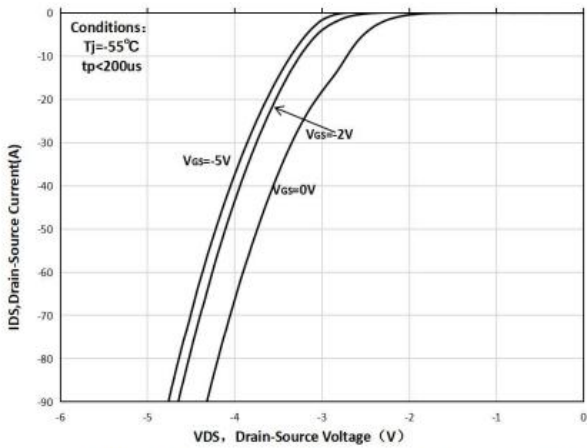


Figure 7. Body Diode Characteristics at -55°C

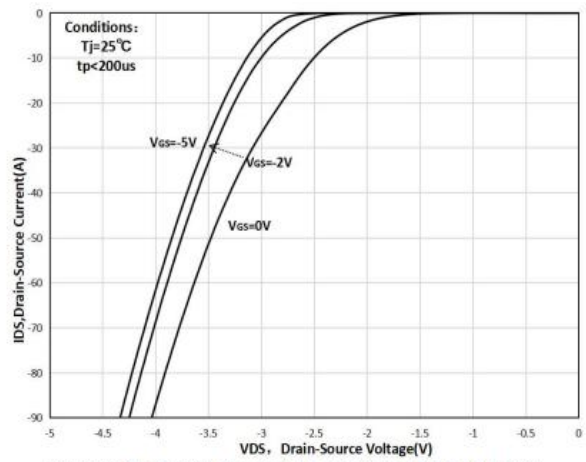


Figure 8. Body Diode Characteristics at 25°C

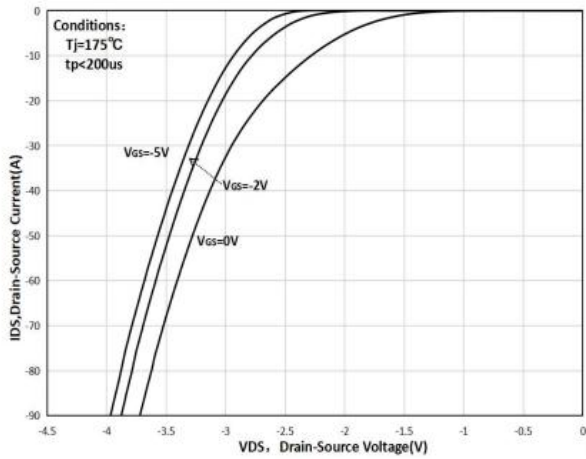


Figure 9. Body Diode Characteristics at 175°C

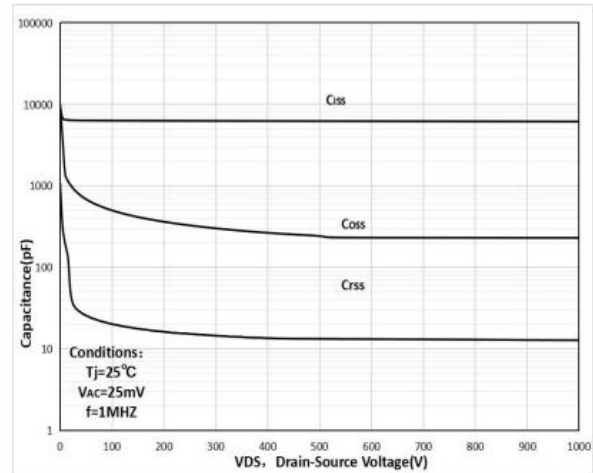


Figure 10. Capacitances vs. Drain-Source Voltage

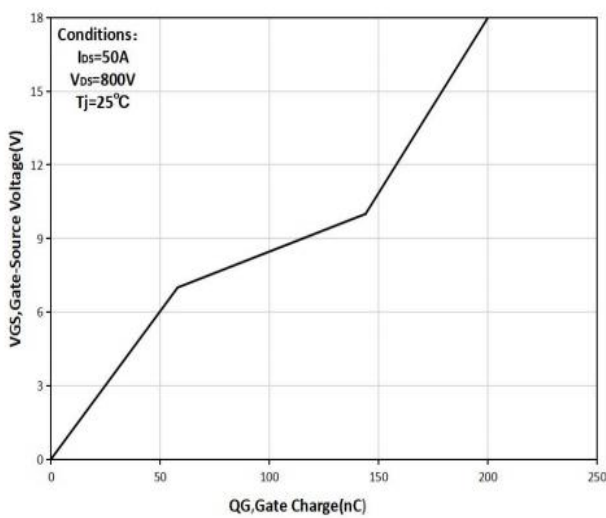


Figure 11. Gate Charge Characteristics

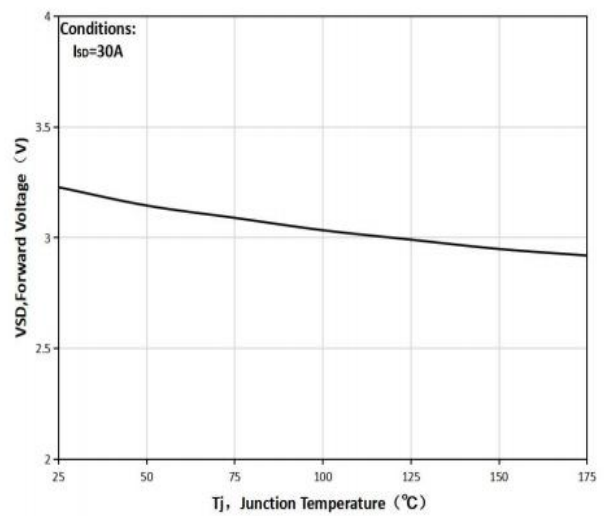


Figure 12. Forward Voltage vs. Junction Temperature

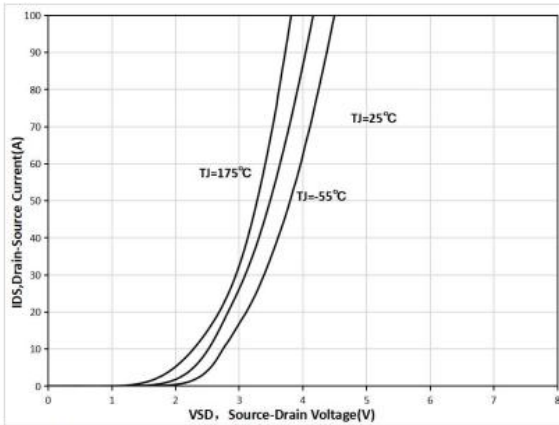


Figure 13. Body Diode Characteristics for Various Junction Temperatures

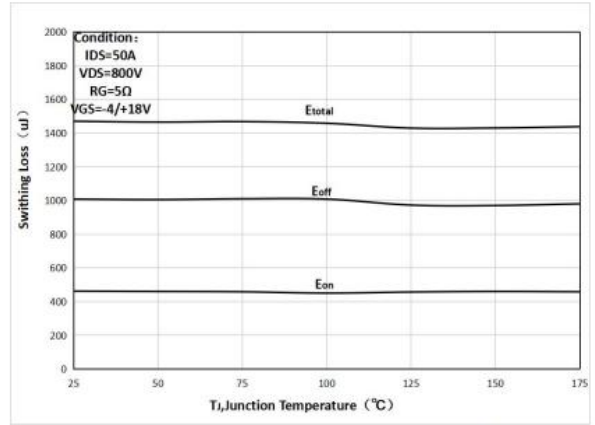


Figure 14. Clamped Inductive Switching Energy Vs. Temperature

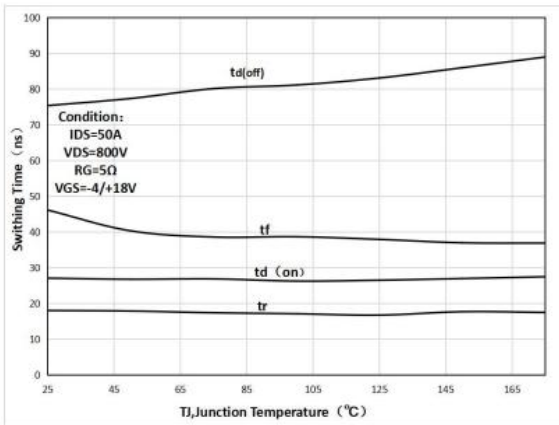


Figure 15. Switching Times vs. Junction Temperature

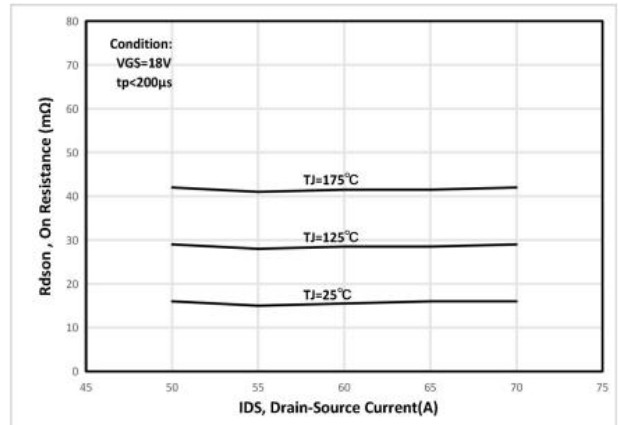


Figure 16. On-Resistance vs. Drain Current

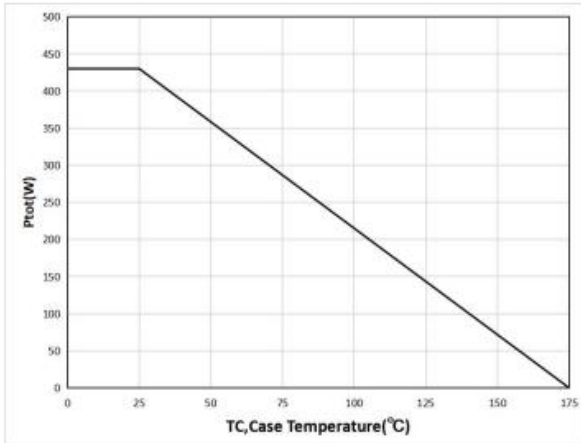


Figure 17. Power Dissipation Derating

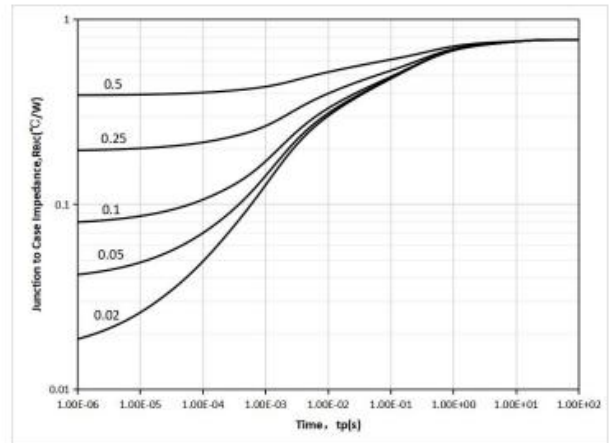


Figure 18. Transient Thermal Impedance

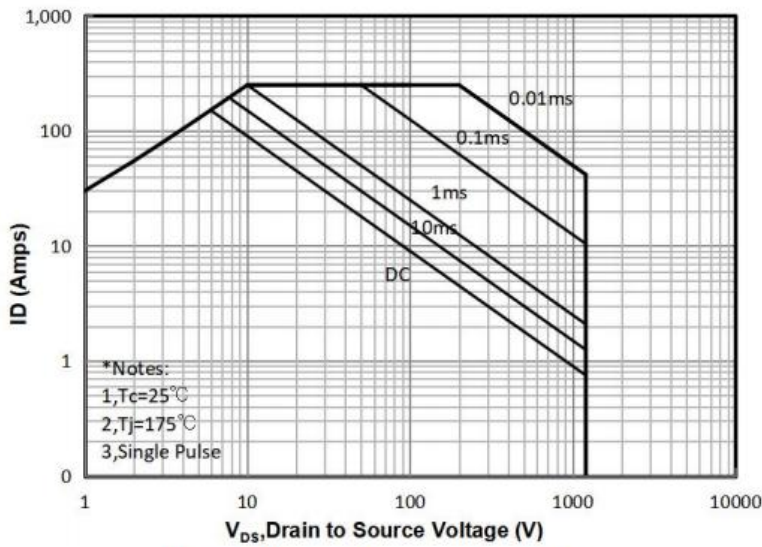
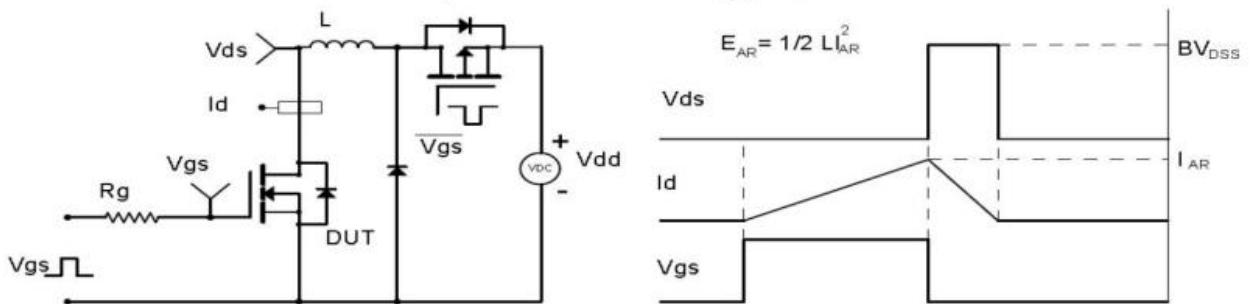


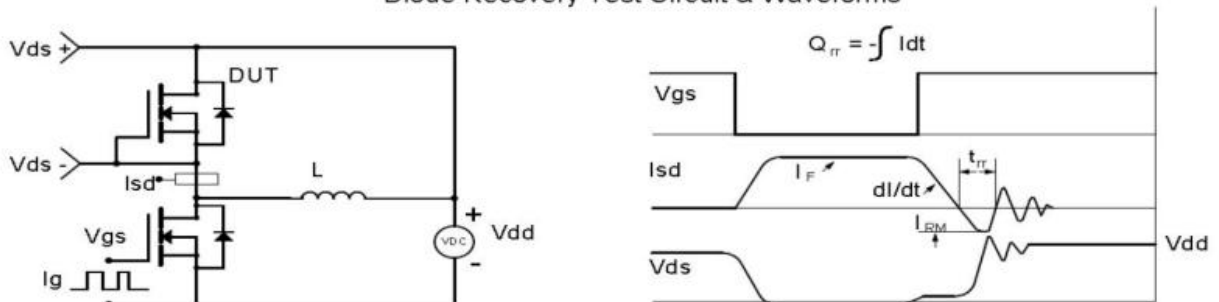
Figure 19. Safe Operating Area

## Test Circuit Waveforms

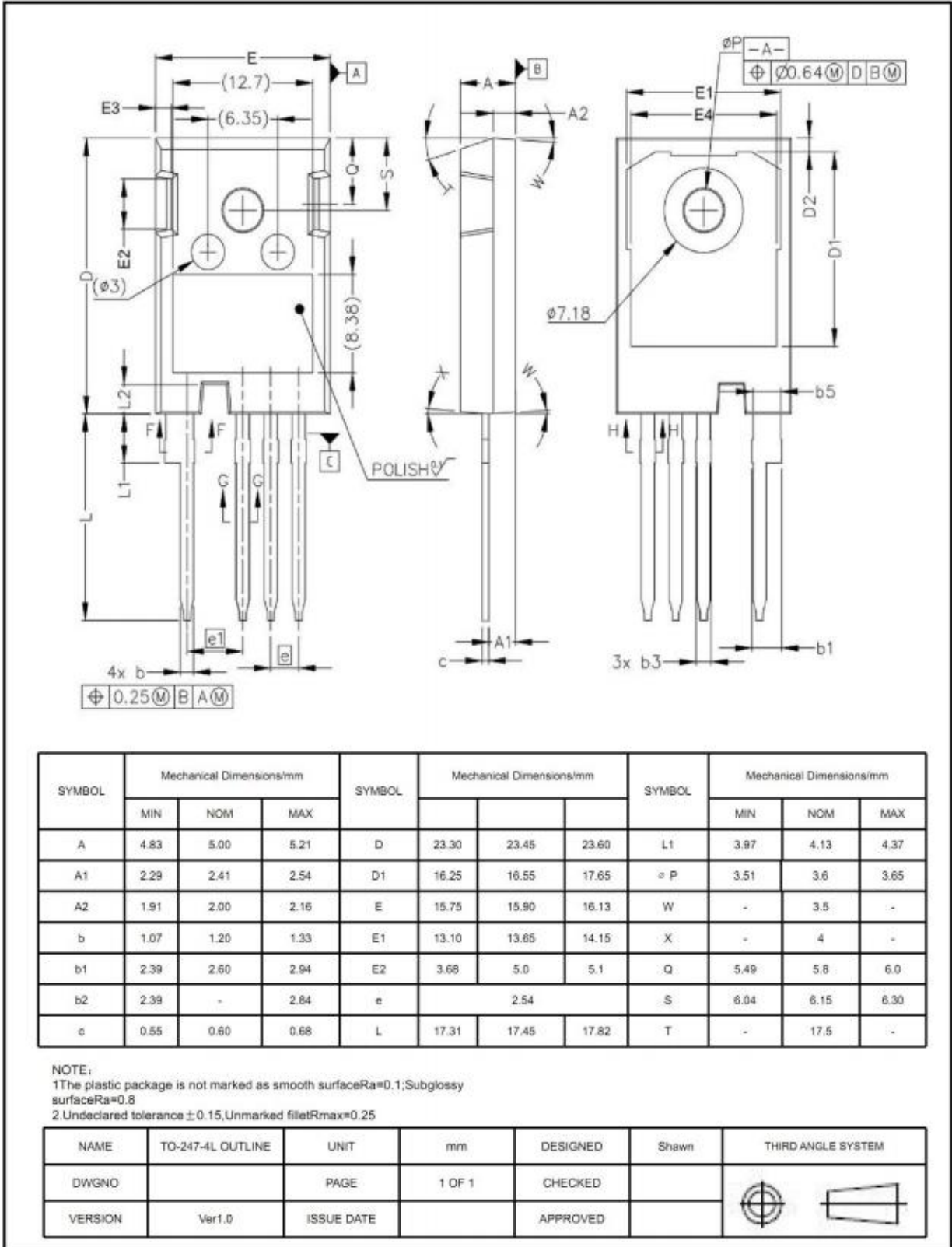
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Dimensions: TO-247-4L





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