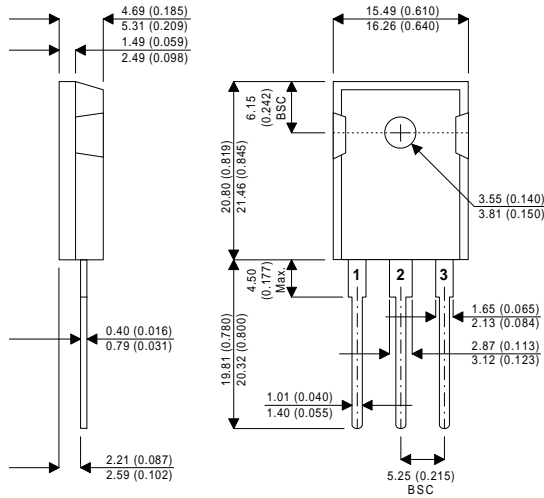


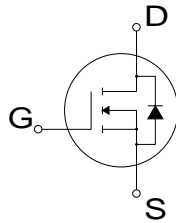
TO-247AD Package Outline.  
Dimensions in mm (inches)



Pin 1 – Gate

Pin 2 – Drain

Pin 3 – Source



**N-CHANNEL  
ENHANCEMENT MODE  
HIGH VOLTAGE  
POWER MOSFETS**

**$V_{DSS}$  500V**  
 **$I_{D(cont)}$  30A**  
 **$R_{DS(on)}$  0.170 $\Omega$**

- **Faster Switching**
- **Lower Leakage**
- **100% Avalanche Tested**
- **Popular TO-247 Package**

StarMOS is a new generation of high voltage N-Channel enhancement mode power MOSFETs. This new technology minimises the JFET effect, increases packing density and reduces the on-resistance. StarMOS also achieves faster switching speeds through optimised gate layout.

**ABSOLUTE MAXIMUM RATINGS** ( $T_{case} = 25^{\circ}C$  unless otherwise stated)

$V_{DSS}$	Drain – Source Voltage	500	V
$I_D$	Continuous Drain Current	30	A
$I_{DM}$	Pulsed Drain Current <sup>1</sup>	120	A
$V_{GS}$	Gate – Source Voltage	$\pm 20$	V
$V_{GSM}$	Gate – Source Voltage Transient	$\pm 30$	
$P_D$	Total Power Dissipation @ $T_{case} = 25^{\circ}C$	370	W
	Derate Linearly	2.96	W/ $^{\circ}C$
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to 150	$^{\circ}C$
$T_L$	Lead Temperature : 0.063" from Case for 10 Sec.	300	
$I_{AR}$	Avalanche Current <sup>1</sup> (Repetitive and Non-Repetitive)	30	A
$E_{AR}$	Repetitive Avalanche Energy <sup>1</sup>	30	mJ
$E_{AS}$	Single Pulse Avalanche Energy <sup>2</sup>	1300	

1) Repetitive Rating: Pulse Width limited by maximum junction temperature.

2) Starting  $T_J = 25^{\circ}C$ ,  $L = 2.89mH$ ,  $R_G = 25\Omega$ , Peak  $I_L = 30A$

**STATIC ELECTRICAL RATINGS** ( $T_{case} = 25^{\circ}C$  unless otherwise stated)

	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain – Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	500			V
$I_{DSS}$	Zero Gate Voltage Drain Current ( $V_{GS} = 0V$ )	$V_{DS} = V_{DSS}$			25	$\mu A$
		$V_{DS} = 0.8V_{DSS}, T_C = 125^{\circ}C$			250	
$I_{GSS}$	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			$\pm 100$	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 1.0mA$	2		4	V
$I_{D(ON)}$	On State Drain Current <sup>2</sup>	$V_{DS} > I_{D(ON)} \times R_{DS(ON)} \text{ Max}$ $V_{GS} = 10V$	30			A
$R_{DS(ON)}$	Drain – Source On State Resistance <sup>2</sup>	$V_{GS} = 10V, I_D = 0.5 I_D [\text{Cont.}]$			0.170	$\Omega$

**DYNAMIC CHARACTERISTICS**

	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$C_{iss}$	Input Capacitance	$V_{GS} = 0V$		4400	5280	pF
$C_{oss}$	Output Capacitance	$V_{DS} = 25V$		600	840	
$C_{rss}$	Reverse Transfer Capacitance	$f = 1MHz$		230	350	
$Q_g$	Total Gate Charge <sup>3</sup>	$V_{GS} = 10V$		200	300	nC
$Q_{gs}$	Gate – Source Charge	$V_{DD} = 0.5 V_{DSS}$		30	45	
$Q_{gd}$	Gate – Drain (“Miller”) Charge	$I_D = I_D [\text{Cont.}] @ 25^{\circ}C$		80	120	
$t_{d(on)}$	Turn-on Delay Time	$V_{GS} = 15V$		12	25	ns
$t_r$	Rise Time	$V_{DD} = 0.5 V_{DSS}$		14	30	
$t_{d(off)}$	Turn-off Delay Time	$I_D = I_D [\text{Cont.}] @ 25^{\circ}C$		55	80	
$t_f$	Fall Time	$R_G = 1.6\Omega$		11	20	

**SOURCE – DRAIN DIODE RATINGS AND CHARACTERISTICS**

	Characteristic	Test Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	(Body Diode)			30	A
$I_{SM}$	Pulsed Source Current <sup>1</sup>	(Body Diode)			120	
$V_{SD}$	Diode Forward Voltage <sup>2</sup>	$V_{GS} = 0V, I_S = -I_D [\text{Cont.}]$			1.3	V
$t_{rr}$	Reverse Recovery Time	$I_S = -I_D [\text{Cont.}], di_S / dt = 100A/\mu s$		510		ns
$Q_{rr}$	Reverse Recovery Charge	$I_S = -I_D [\text{Cont.}], di_S / dt = 100A/\mu s$		10.2		$\mu C$

**THERMAL CHARACTERISTICS**

	Characteristic	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case			0.34	$^{\circ}C/W$
$R_{\theta JA}$	Junction to Ambient			40	

1) Repetitive Rating: Pulse Width limited by maximum junction temperature.

2) Pulse Test: Pulse Width < 380 $\mu$ S , Duty Cycle < 2%

3) See MIL-STD-750 Method 3471



CAUTION — Electrostatic Sensitive Devices. Anti-Static Procedures Must Be Followed.

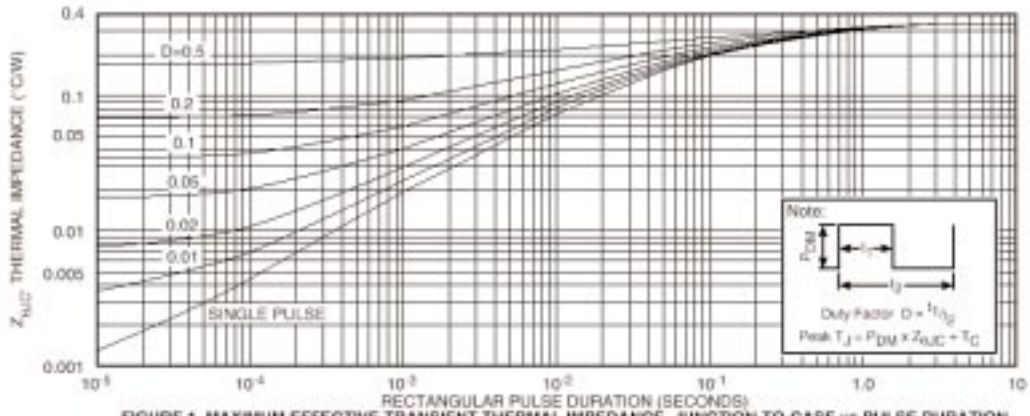


FIGURE 1, MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs PULSE DURATION

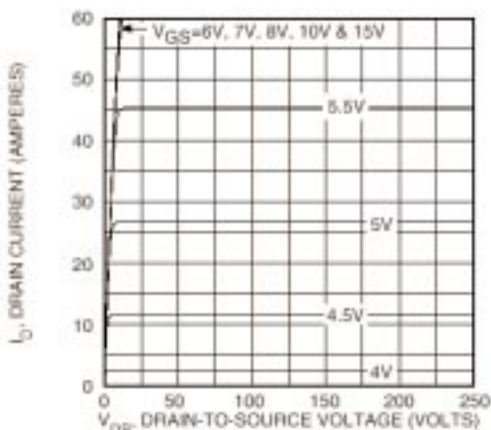


FIGURE 2, TYPICAL OUTPUT CHARACTERISTICS

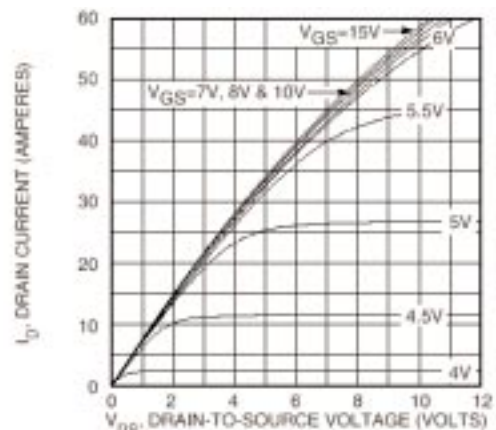


FIGURE 3, TYPICAL OUTPUT CHARACTERISTICS

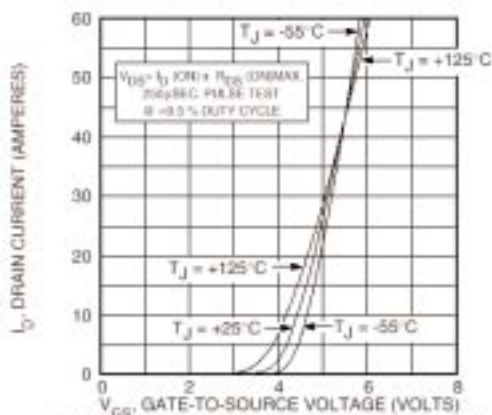


FIGURE 4, TYPICAL TRANSFER CHARACTERISTICS

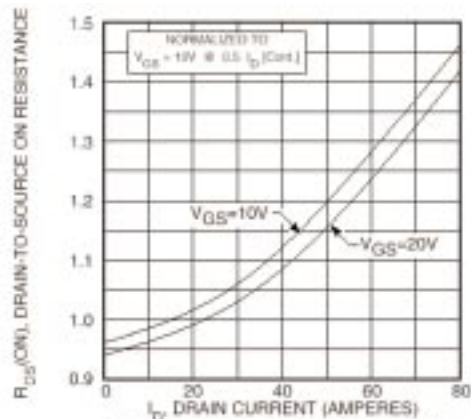


FIGURE 5,  $R_{DS(on)}$  vs DRAIN CURRENT

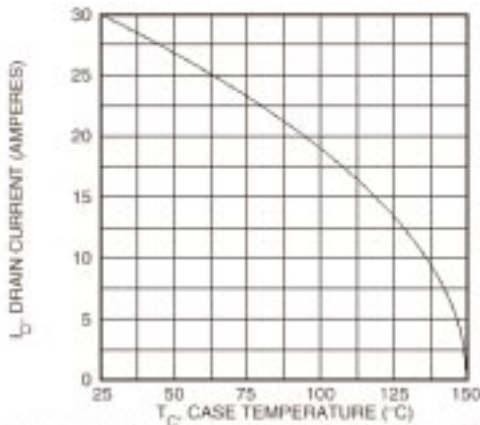


FIGURE 6. MAXIMUM DRAIN CURRENT vs CASE TEMPERATURE

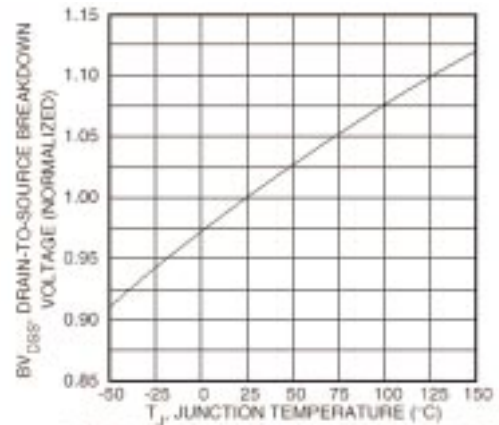


FIGURE 7. BREAKDOWN VOLTAGE vs TEMPERATURE

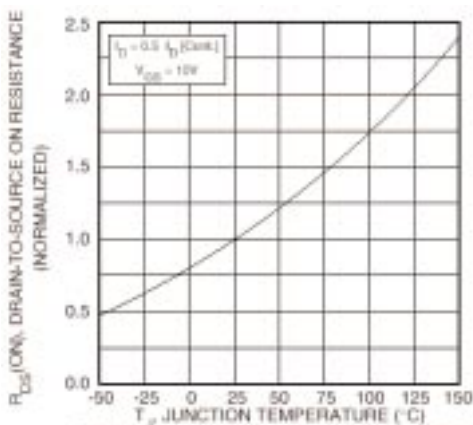


FIGURE 8. ON-RESISTANCE vs. TEMPERATURE

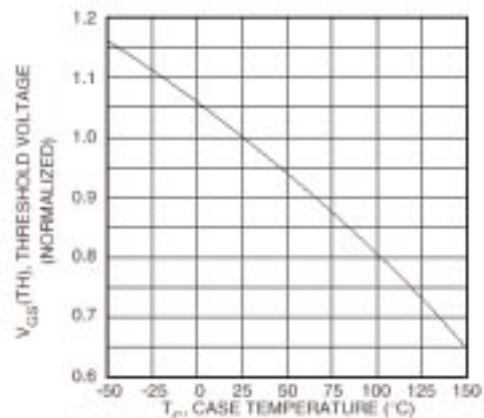


FIGURE 9. THRESHOLD VOLTAGE vs TEMPERATURE

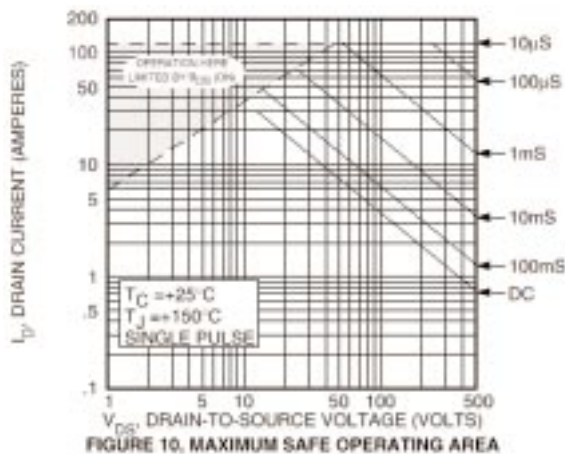


FIGURE 10. MAXIMUM SAFE OPERATING AREA

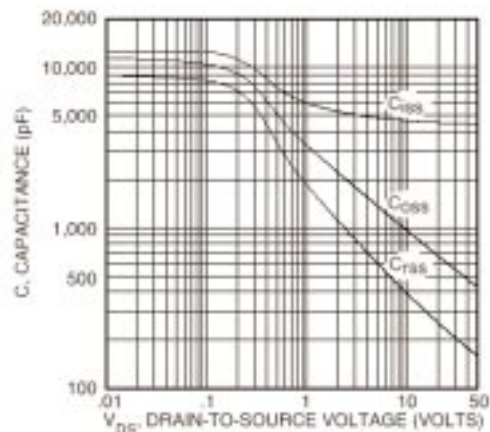


FIGURE 11. TYPICAL CAPACITANCE vs DRAIN-TO-SOURCE VOLTAGE

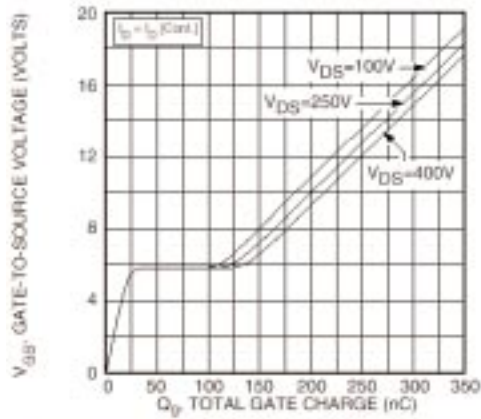


FIGURE 12. GATE CHARGES vs GATE-TO-SOURCE VOLTAGE

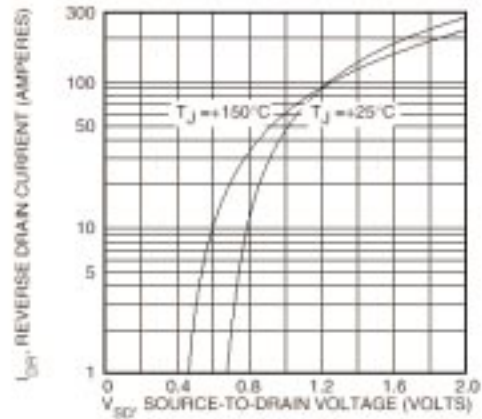


FIGURE 13. TYPICAL SOURCE-DRAIN DIODE FORWARD VOLTAGE