

## 250V/5.5A N-Channel Power MOSFET (Discontinued)

### General Description

- Low on resistance
- Improved inductive ruggedness
- Fast switching time
- Rugged polysilicon gate cell structure
- Lower input capacitance
- Extended safe operating area
- Improved high temperature reliability

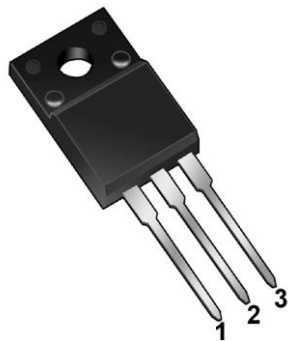


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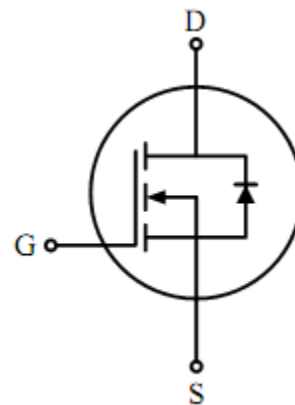
### Features

- $V_{DSS}=250V$ ,  $I_D=5.5A$
- $R_{DS(ON)} \leq 0.45 \Omega @ V_{GS}=10V$

### Pin Configuration



1: Gate 2: Drain 3: Source



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## Absolute Maximum Ratings

Symbol	Description	IRFS634	Unit
<b>V<sub>DSS</sub></b>	Drain-Source Voltage (1)	250	Vdc
<b>V<sub>DGR</sub></b>	Drain-Gate Voltage ( $R_{GS} = 1.0M\Omega$ ) (1)	250	Vdc
<b>V<sub>GS</sub></b>	Gate-Source Voltage	$\pm 20$	Vdc
<b>I<sub>D</sub></b>	Drain Current –Continuous $T_c=25^\circ C$	5.5	Adc
<b>I<sub>D</sub></b>	Drain Current –Continuous $T_c=100^\circ C$	3.5	Adc
<b>I<sub>DM</sub></b>	Drain Current - Pulsed (2)	32.4	Adc
<b>I<sub>GM</sub></b>	Gate Current - Pulsed	$\pm 15$	Adc
<b>E<sub>AS</sub></b>	Single Pulsed Avalanche Energy (3)	90	mJ
<b>I<sub>AS</sub></b>	Avalanche Current	5.5	A
<b>P<sub>D</sub></b>	Total Power Dissipation $T_c=25^\circ C$ Derate above $25^\circ C$	35 0.28	W W/ $^\circ C$
<b>T<sub>J</sub></b>	Junction Temperature	+150	$^\circ C$
<b>T<sub>STG</sub></b>	Storage Temperature Range	-55 to +150	$^\circ C$
<b>T<sub>L</sub></b>	Maximum Lead Temp. for Soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Note: (1)  $T_J=25^\circ C$  to  $150^\circ C$

(2) Repetitive rating: Pulse width limited by max. junction temperature

(3)  $L=5.5mH$ ,  $V_{dd}=50V$ ,  $R_G=25\Omega$ , Starting  $T_J=25^\circ C$

## Electrical Characteristics ( $T_c = 25^\circ C$ unless otherwise specified)

### Off Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>V<sub>(BR)DSS</sub></b>	Drain-Source Breakdown Voltage	250	-	-	V	$V_{GS}=0V$ , $I_D=250\mu A$
<b>I<sub>DSS</sub></b>	Zero Gate Voltage Drain Current	-	-	250	uA	$V_{DS}=-Max.$ Rating, $V_{GS}=0V$
		-	-	1000		$V_{DS}=0.8$ Max. Rating, $V_{GS}=0V$ , $T_c=125^\circ C$
<b>I<sub>GSS</sub></b>	Gate-Source Leakage Current	-	-	$\pm 100$	nA	$V_{GS}=\pm 20V$

### On Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>V<sub>GS(th)</sub></b>	Gate Threshold Voltage	2.0	-	4.0	V	$V_{DS}=V_{GS}$ , $I_D=250\mu A$

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Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>R<sub>DS(ON)</sub></b>	Static Drain-Source On-State Resistance (4)	-	0.40	-	Ω	V <sub>GS</sub> =10V, I <sub>D</sub> =4.1A
<b>g<sub>FS</sub></b>	Forward Transconductance (4)	2.9	-	-	S	V <sub>DS</sub> ≥50V, I <sub>D</sub> =4.1A

Note: (4) Pulse test: Pulse width ≤300us, Duty cycles≤2%

### Dynamic Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>C<sub>iss</sub></b>	Input Capacitance	-	764	-	pF	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz
<b>C<sub>oss</sub></b>	Output Capacitance	-	100	-		
<b>C<sub>rss</sub></b>	Reverse Transfer Capacitance	-	32	-		

### Switching Characteristics

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>t<sub>D(on)</sub></b>	Turn-On Delay Time	-	-	14	ns	V <sub>DD</sub> =0.5 V <sub>DSS</sub> , R <sub>L</sub> =18Ω, I <sub>D</sub> =8.1A, (MOSFET switching times are essentially independent of operating temperature)
<b>t<sub>r</sub></b>	Turn-On Rise Time	-	-	35		
<b>t<sub>D(off)</sub></b>	Turn-Off Delay Time	-	-	47		
<b>t<sub>f</sub></b>	Turn-Off Fall Time	-	-	29		
<b>Q<sub>g</sub></b>	Total Gate Charge (Gate- Source Plus Gate-Drain)	-	-	40	nC	V <sub>GS</sub> =10V, I <sub>D</sub> =8.1A, V <sub>DS</sub> =0.8 Max. Rating, (Gate charge is essentially independent of operating temperature)
<b>Q<sub>gs</sub></b>	Gate-Source Charge	-	6.3	-		
<b>Q<sub>gd</sub></b>	Gate-Drain Charge	-	16.3	-		

### Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Description	Min.	Typ.	Max.	Unit	Conditions
<b>I<sub>S</sub></b>	Continuous Source Current (Body Diode)	-	-	8.1	A	Modified MOSFET symbol showing the integral reverse P-N junction rectifier-
<b>I<sub>SM</sub></b>	Pulse Source Current (Body Diode) (2)	-	-	32	A	
<b>V<sub>sd</sub></b>	Diode Forward Voltage (4)	-	-	2.0	V	I <sub>S</sub> =8.1A, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C
<b>T<sub>rr</sub></b>	Reverse Recovery Time	-	190	390	ns	I <sub>F</sub> =8.1A, dI <sub>F</sub> /dt=100A/μS, T <sub>J</sub> =25°C

Note: (2) Repetitive rating: Pulse width limited by max. junction temperature

(4) Pulse test: Pulse width ≤300us, Duty cycles≤2%

Thermal Resistance

Symbol	Description	Typ.	Max.	Unit	Remark
$R_{\theta JC}$	Junction-to-Case	-	3.57	K/W	
$R_{\theta CS}$	Case-to-Sink	0.5	-	K/W	Mounting surface flat, smooth and greased
$R_{\theta JA}$	Junction-to-Ambient	-	62.5	K/W	Free air operation

Typical Characteristics Curves

Fig.1- Typical Output Characteristics

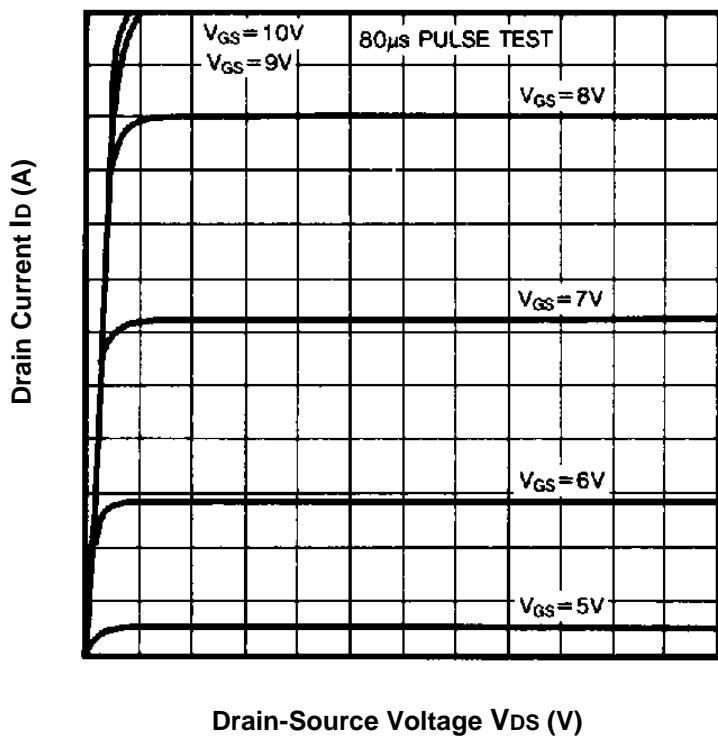


Fig.2- Typical Transfer Characteristics

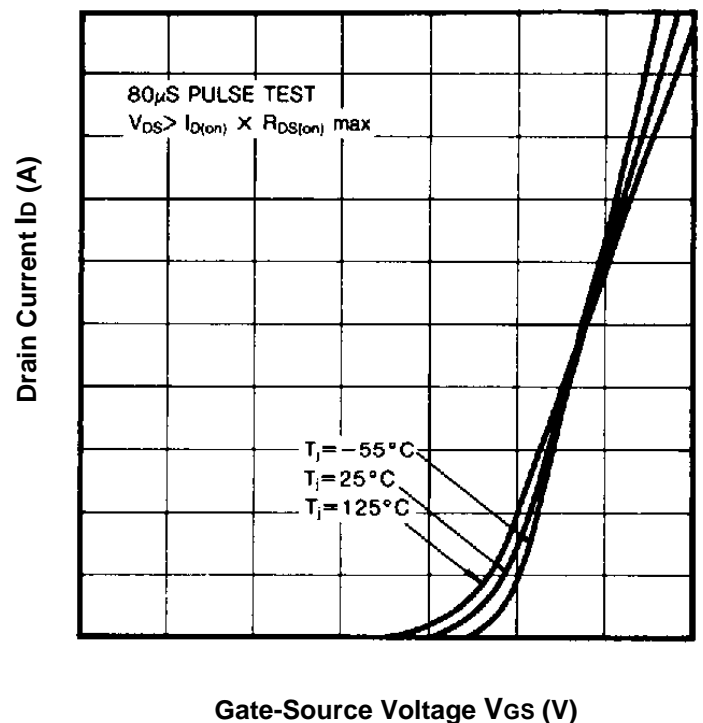


Fig.3- Typical Saturation Characteristics

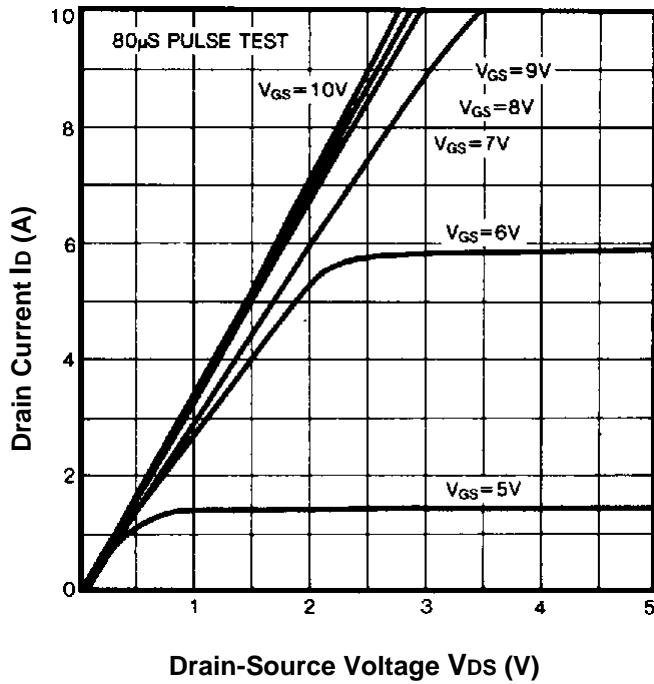


Fig.4- Maximum Safe Operation Area

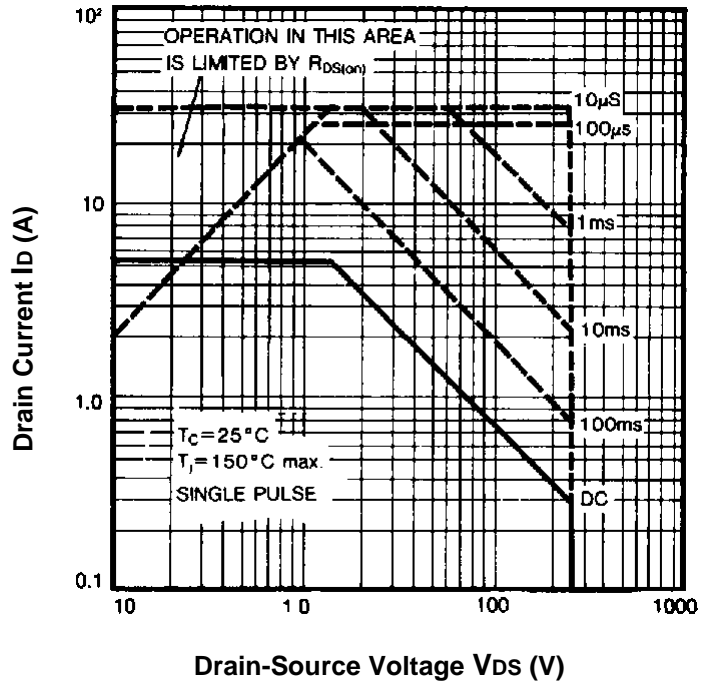


Fig.5- Maximum Effective Transient Thermal Impedance Junction-Case VS. Pulse Duration

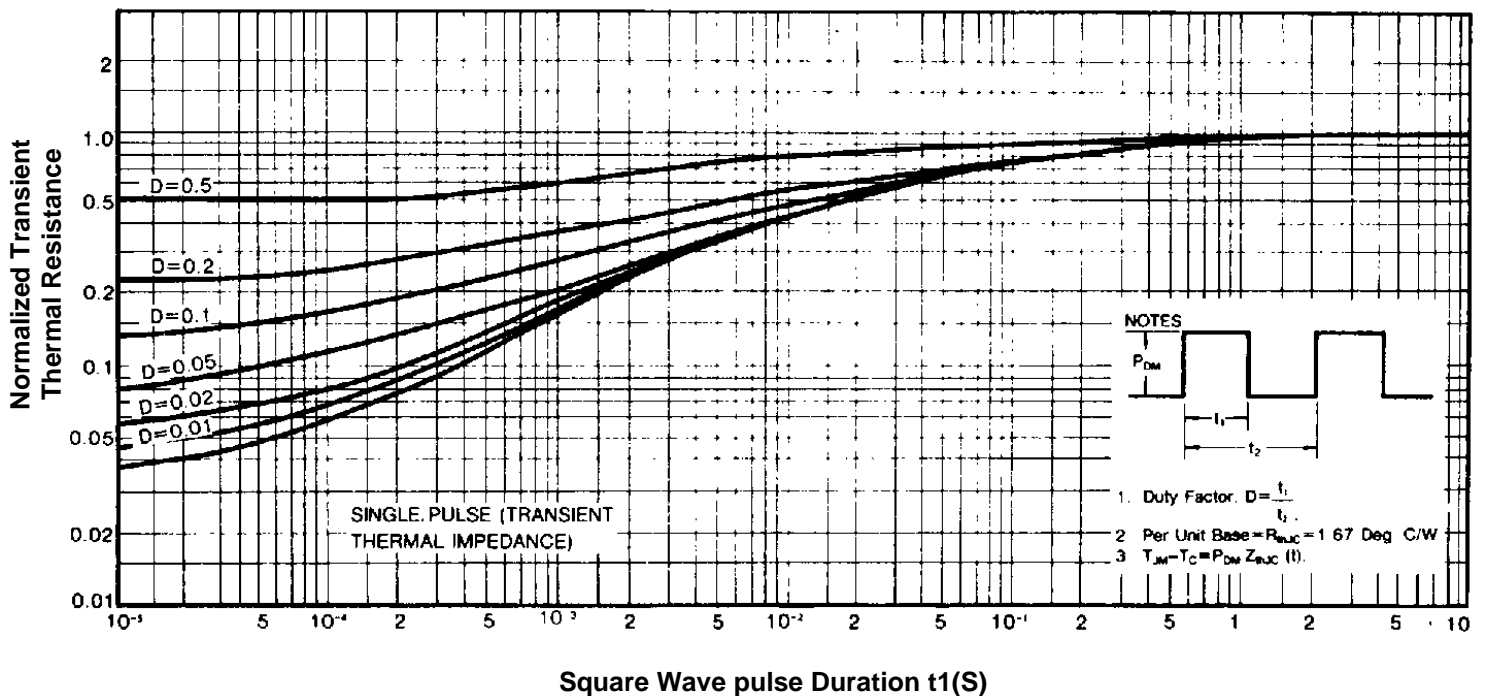


Fig.6- Typical Transconductance Vs. Drain Current

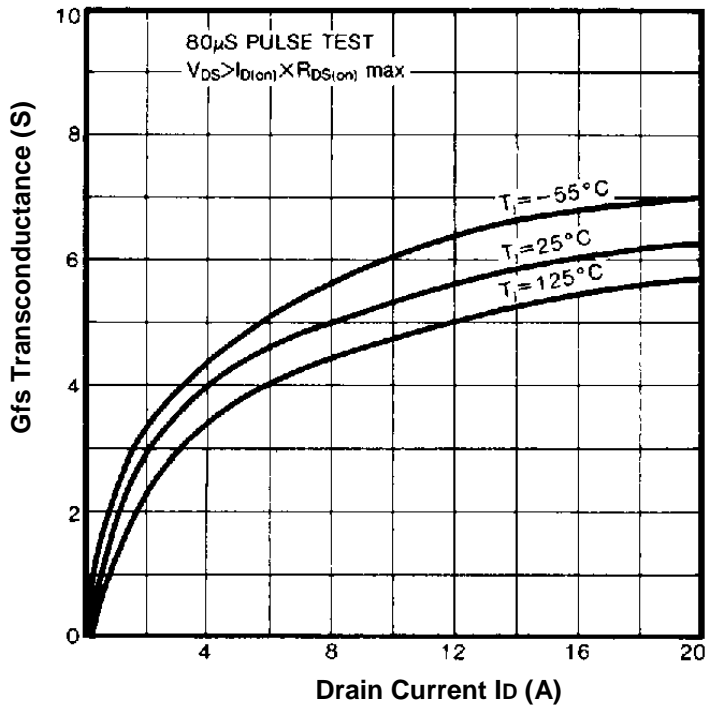


Fig.7- Typical Source-Drain Diode Forward Voltage

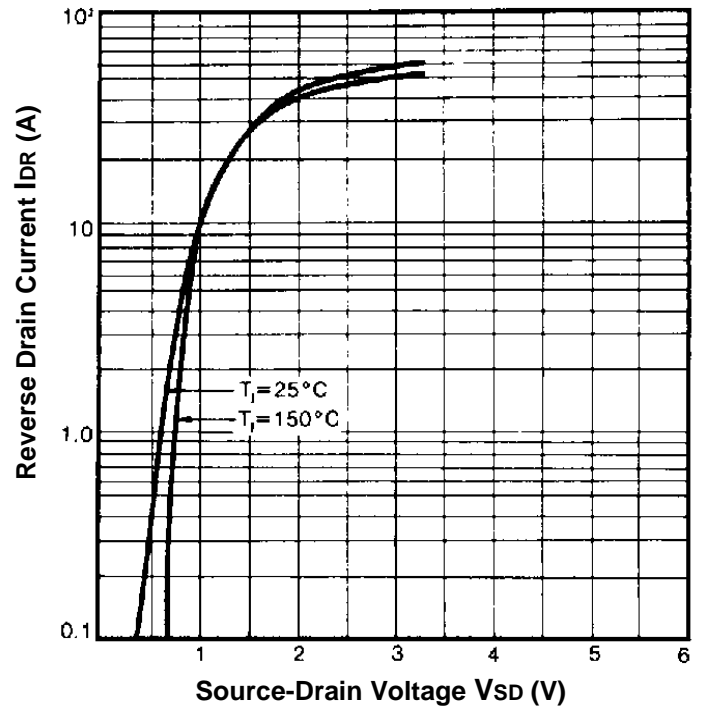


Fig.8- Breakdown Voltage Vs. Temperature

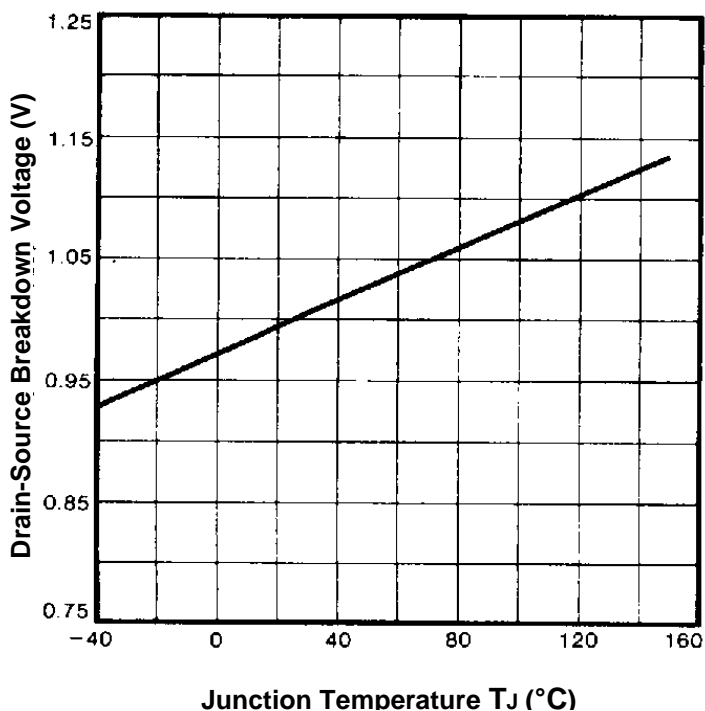


Fig.9- Normalized On-Resistance Vs. Temperature

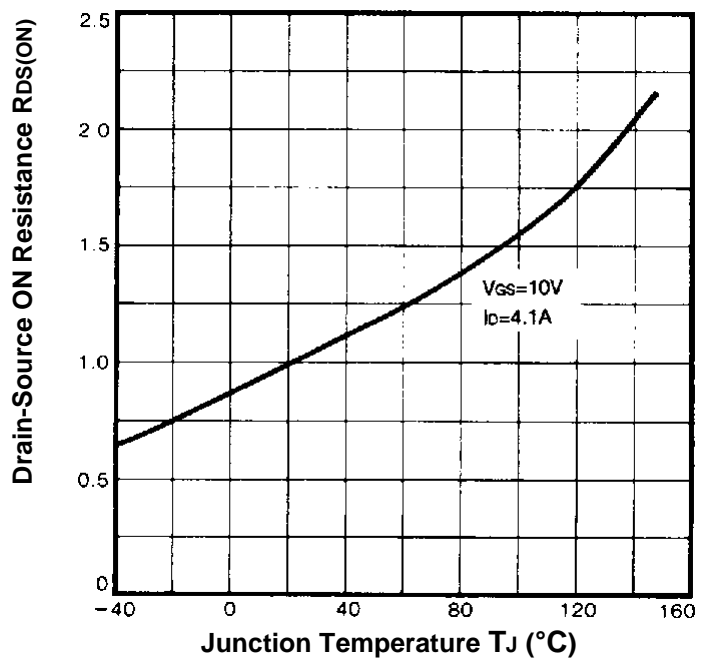


Fig.10- Typical Gate Charge Vs. Gate-Source Voltage

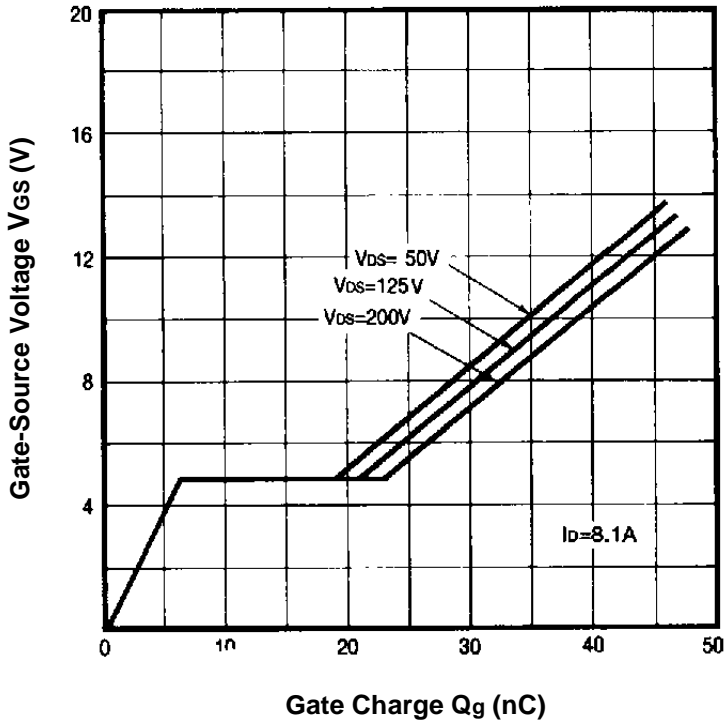


Fig.11- Typical Capacitance Vs. Drain-Source Voltage

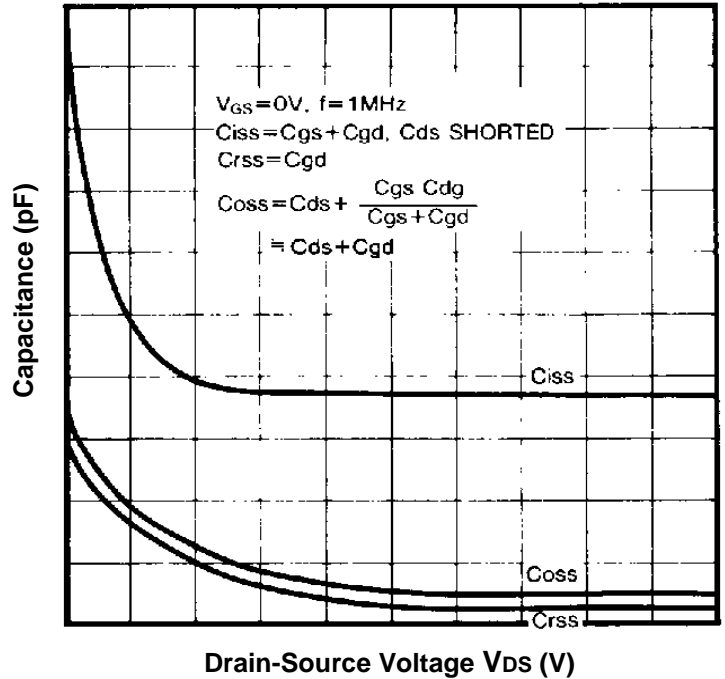


Fig.12- Typical On-Resistance Vs. Drain Current

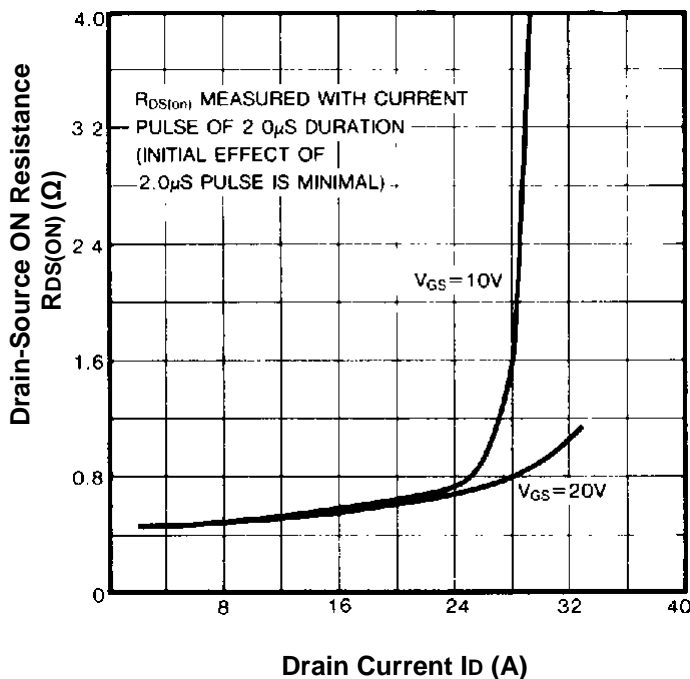


Fig.13- Maximum Drain Current Vs. Case Temperature

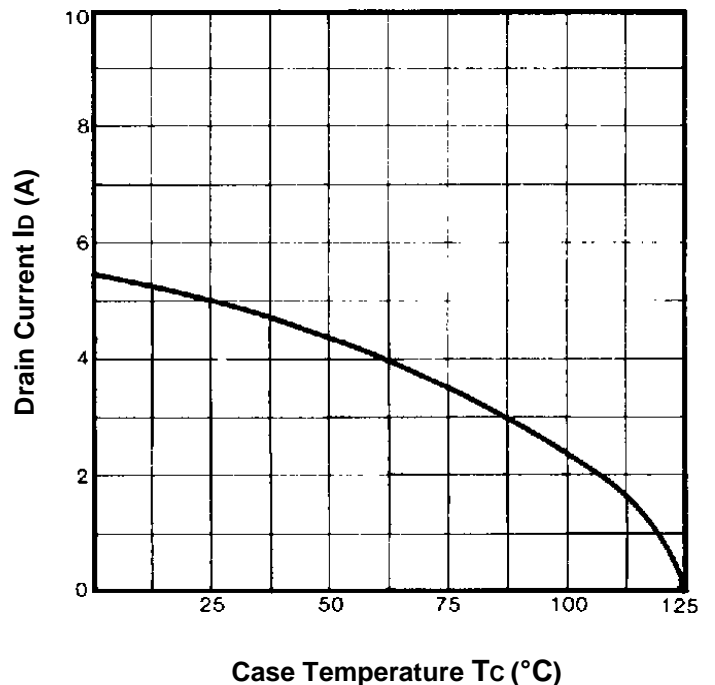
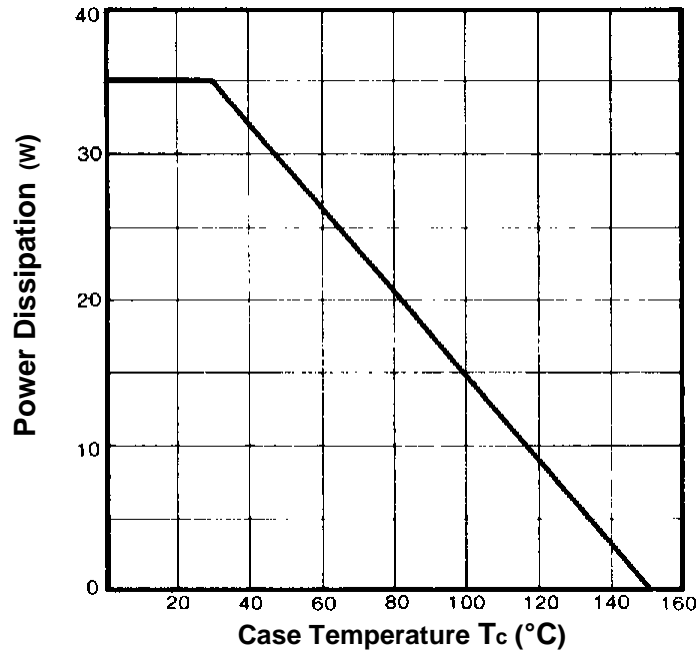
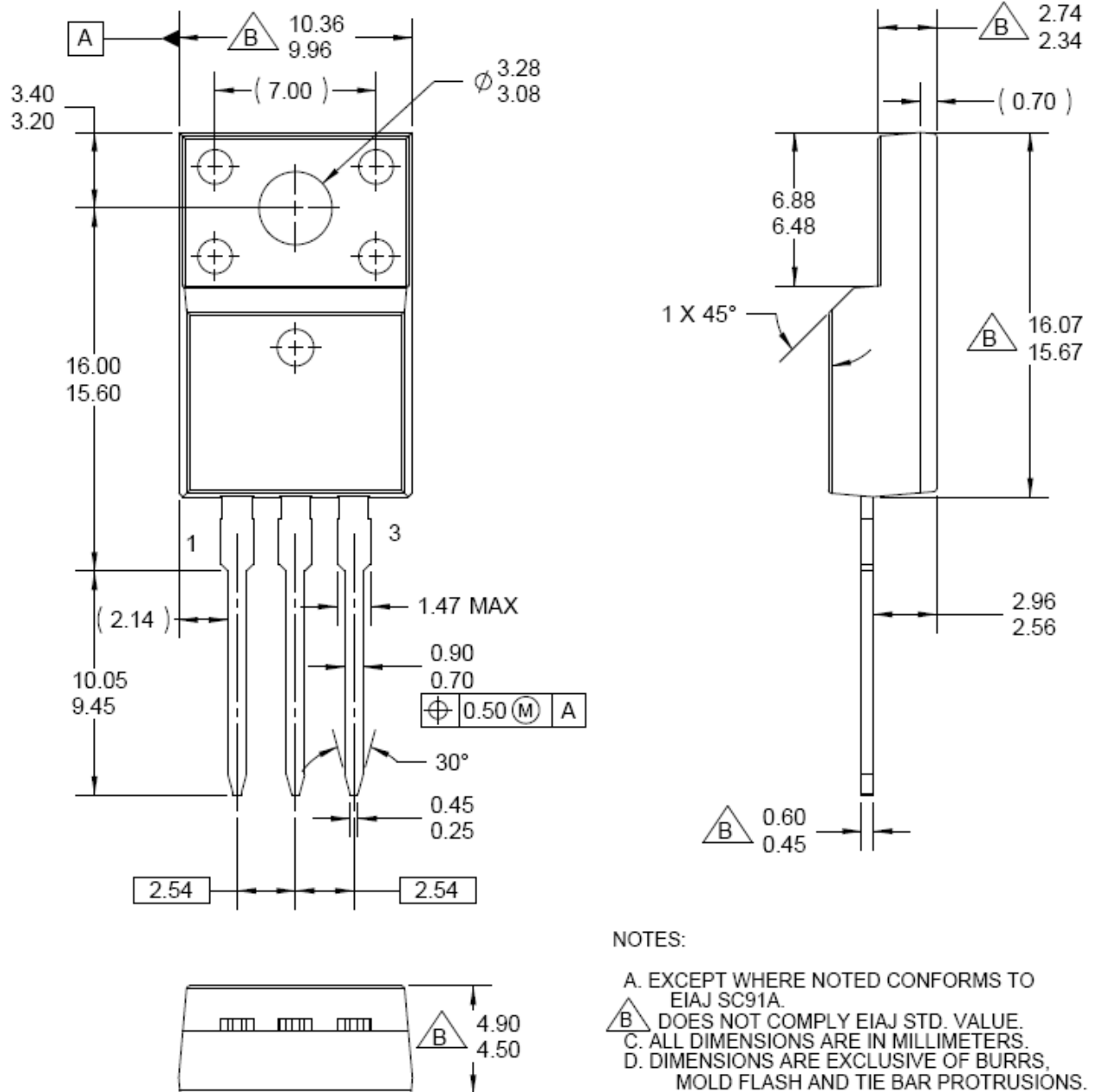


Fig.14-Power Vs. Temperature Derating Curve





Dimensions in mm



NOTES:

- A. EXCEPT WHERE NOTED CONFORMS TO EIAJ SC91A.
- $\triangle B$  DOES NOT COMPLY EIAJ STD. VALUE.
- C. ALL DIMENSIONS ARE IN MILLIMETERS.
- D. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR PROTRUSIONS.

TO-220F

**Order Information**

Part # to order	Manufacturer	Outline	Packing	RoHS Status
IRFS634-SM-C	SAMSUNG	TO-220F	Tube	NO

**How to contact us****USA HEADQUARTERS**

28040 WEST HARRISON PARKWAY, VALENCIA, CA 91355-4162

Tel: (800)-TAITRON (800)-824-8766 (661)-257-6060

Fax: (800)-TAITFAX (800)-824-8329 (661)-257-6415

Email: [taitron@taitroncomponents.com](mailto:taitron@taitroncomponents.com)Http://[www.taitroncomponents.com](http://www.taitroncomponents.com)**TAITRON COMPONENTS INCORPORATED TAIWAN BRANCH**

6F., NO.190, SEC. 2, ZHONGXING RD., XINDIAN DIST., NEW TAIPEI CITY 23146, TAIWAN R.O.C.

Tel: 886-2-2913-6238

Fax: 886-2-2913-6239

**TAITRON COMPONENT TECHNOLOG SHANGHAI CORPORATION**

SUITE 1503, METROBANK PLAZA, 1160 WEST YAN'AN ROAD, SHANGHAI, 200052, CHINA

Tel: +86-21-5424-9942

Fax: +86-21-2302-5027