SHANGHAI SINO-IC
MICROELECTRONICS CO., LTD.

SE47NS60

N-Channel Enhancement-Mode COOLMOSFET

Revision: A

General Description

Thigh Density Cell Design For Ultra Low On-Resistance Fully Characterized Avalanche Voltage and Current Improved Shoot-Through FOM

- Simple Drive Requirement
- Small Package Outline
- Surface Mount Device

Features

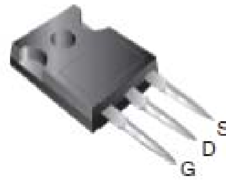
For a single MOSFET

- V_{DS} = 600V
- $R_{DS(ON)}$ = 60mΩ @ V_{GS}=10V @I_{DS}=23A

Pin configurations

See Diagram below

TO-3P



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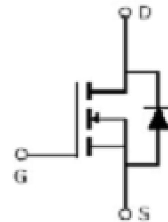


Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-Source Voltage		V_{DS}	600	V
Gate-Source Voltage		V_{GS}	±30	V
Drain Current	Continuous	I_D	47	A
	Pulsed		140	
Total Power Dissipation	@TC=25℃	P_D	391	W
Operating Junction Temperature Range		T_J	-55 to 150	℃

Thermal Resistance

Symbol	Parameter	Min	Max	Units
$R_{\theta JC}$	Junction to Case		0.32	℃/W
$R_{\theta JA}$	Junction to Ambient (t≦10s)		62	℃/W

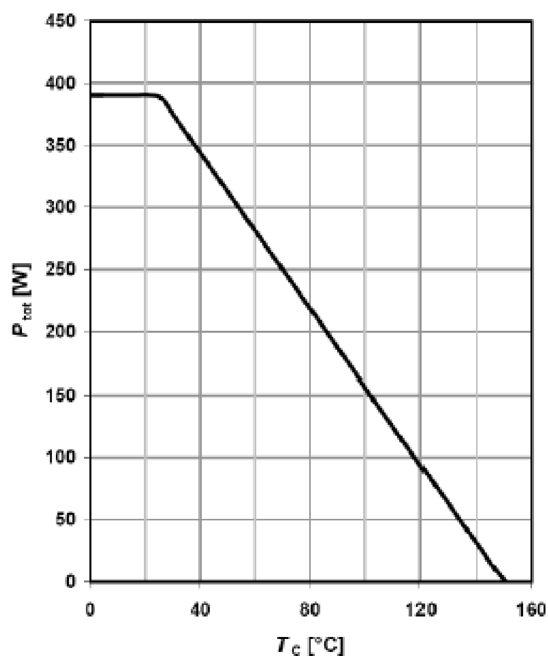
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Electrical Characteristics (TJ=25℃ unless otherwise noted)						
OFF CHARACTERISTICS (Note 2)						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=250μA, V_{GS}=0 V	600			V
I_{DSS}	Drain to Source Leakage Current	V_{DS}= 600V, V_{GS}=0V			1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=20 V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=250μA	2.5		4.5	V
$R_{DS(ON)}$	Static Drain-Source On-Resistance [2]	V_{GS}=10V, I_D=23A		60	70	mΩ
gFS	Forward Transconductance	V_{DS}= 40V, I_D=25A		30		S
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=25V, f=1MHz		3800		pF
C_{oss}	Output Capacitance			215		pF
C_{rss}	Reverse Transfer Capacitance			70		pF
SWITCHING PARAMETERS						
Q_g	Total Gate Charge [2]	V_{GS}=10V, V_{DD}=480V, I_D=23A		170		nC
Q_{gs}	Gate Source Charge			21		nC
Q_{gd}	Gate Drain Charge			87		nC
$t_{d(on)}$	Turn-On Delay Time	V_{GS}=13V, V_{DS}=480V, R_{GEN}=20Ω I_D=23A		16		ns
$t_{d(off)}$	Turn-Off Delay Time			83		ns
$t_{d(r)}$	Turn-On Rise Time			12		ns
$t_{d(f)}$	Turn-Off Fall Time			5		ns

Source-Drain Diode

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
I_S	Drain-Source Diode Forward Current				47	A
I_{SM}	Pulse Drain-Source Diode Forward Current				140	A
VSD	Diode Forward Voltage	IF=23A, VGS=0V, dI/dt=100A/μs		0.9	1.5	V
trr	Reverse Recovery Time			720		ns
Qrr	Reverse Recovery Charge			19		μC

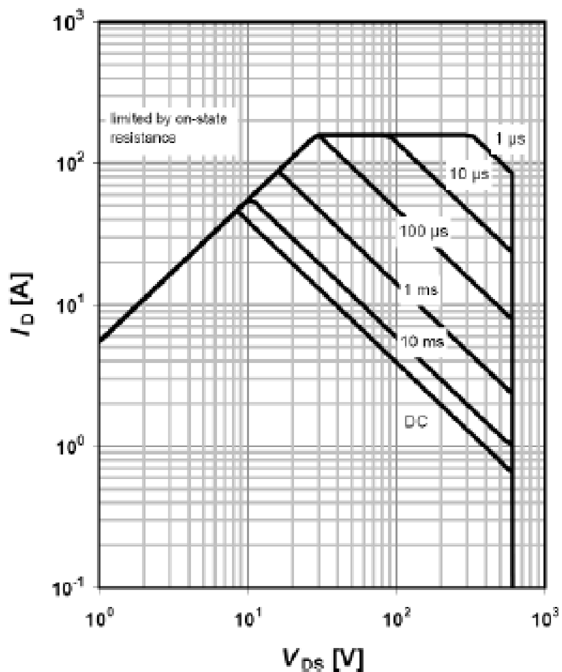
Typical Characteristics

Power dissipation



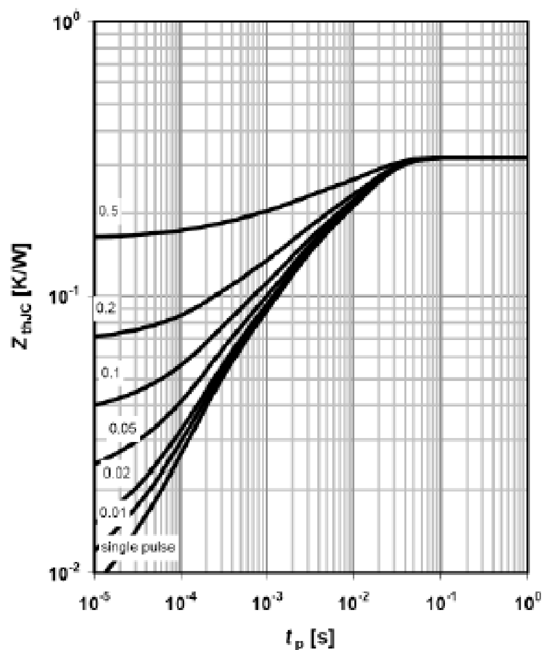
P_{tot}=f(T_C)

Safe operating area TC=25 °C



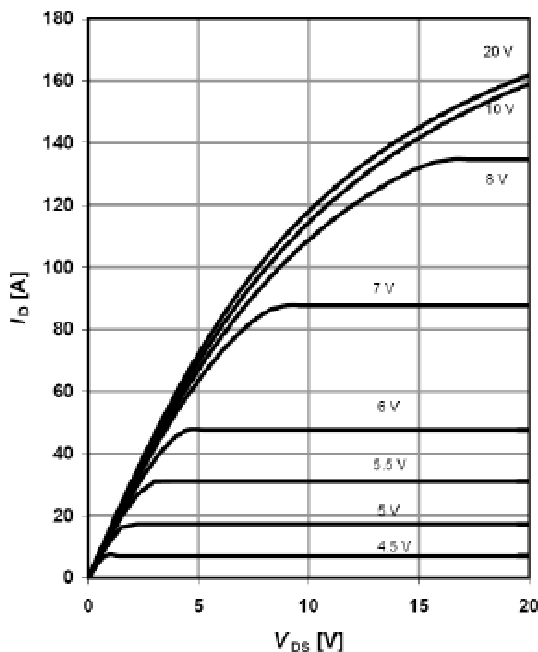
I_D=f(V_{DS}); T_C=25 °C; D=0; parameter t_p

Max. transient thermal impedance



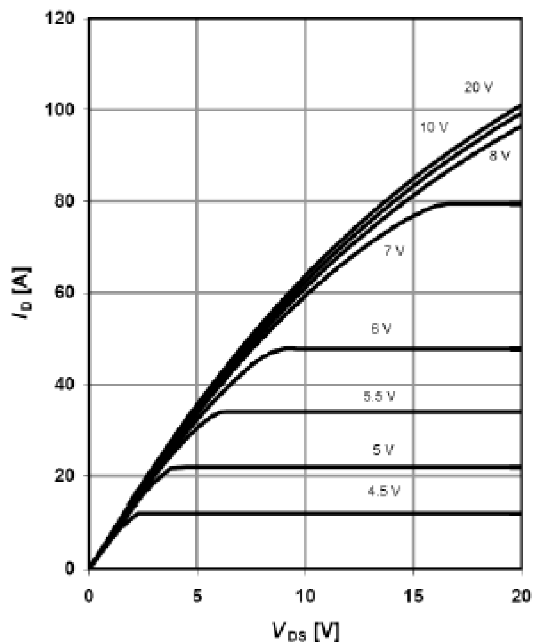
$Z_{(thJC)}$=f(tp); parameter D=tp/T

Typ. output characteristics T_j=25 ℃



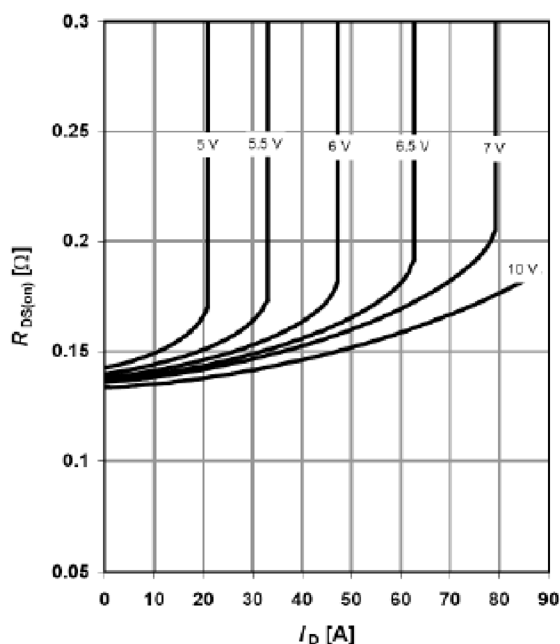
I_D=f(V_{DS}); T_j=25 °C ; parameter: V_{GS}

Typ. output characteristics T_j=125 ℃



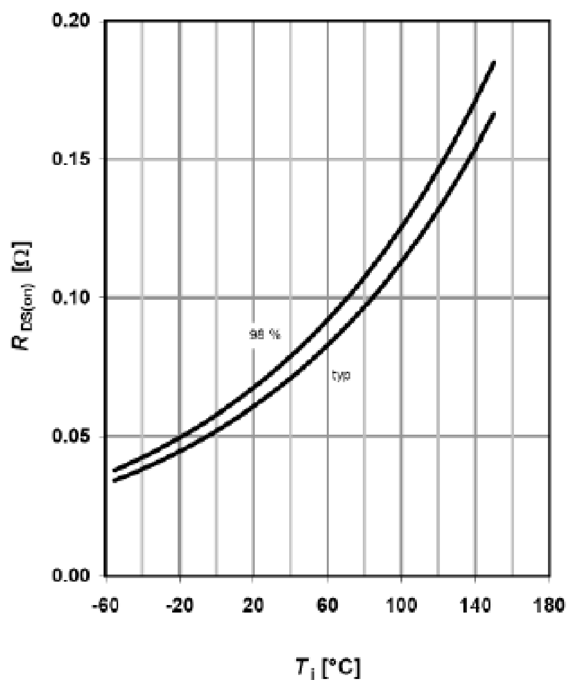
I_D=f(V_{DS}); T_j=125 °C ; parameter: V_{GS}

Typ. drain-source on-state resistance



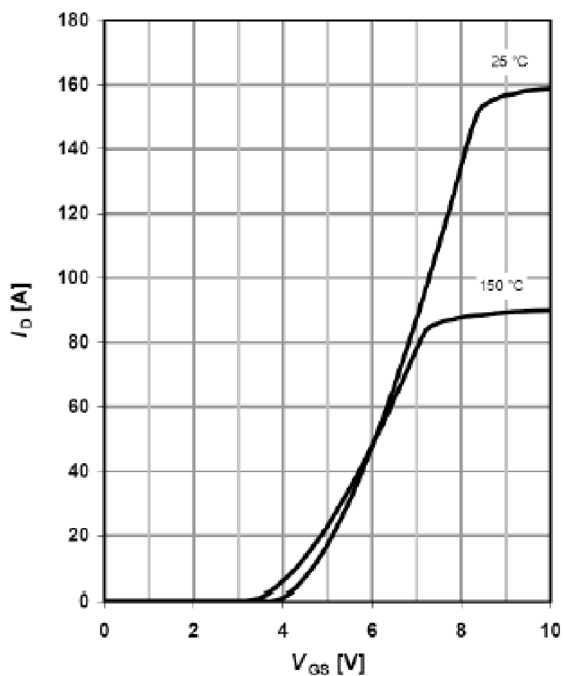
R_{DS}(on)=f(I_D); T_j=125 °C ; parameter:V_{GS}

Typ. drain-source on-state resistance



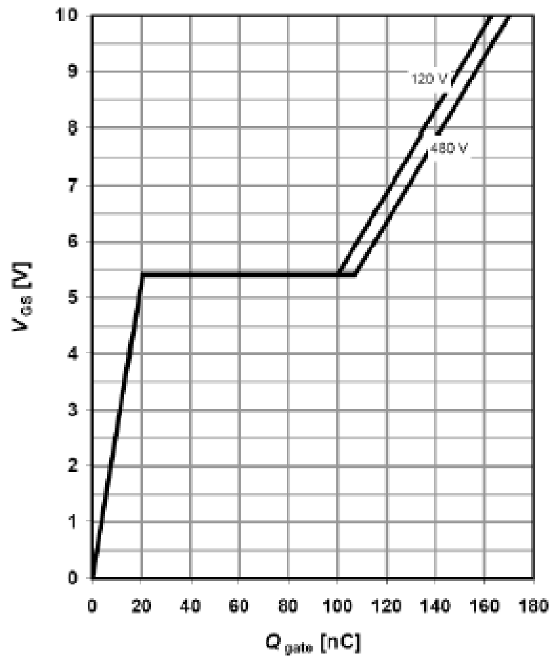
R_{DS}(on)=f(T_j); I_D=23 A; V_{GS}=10 V

Typ. transfer characteristics



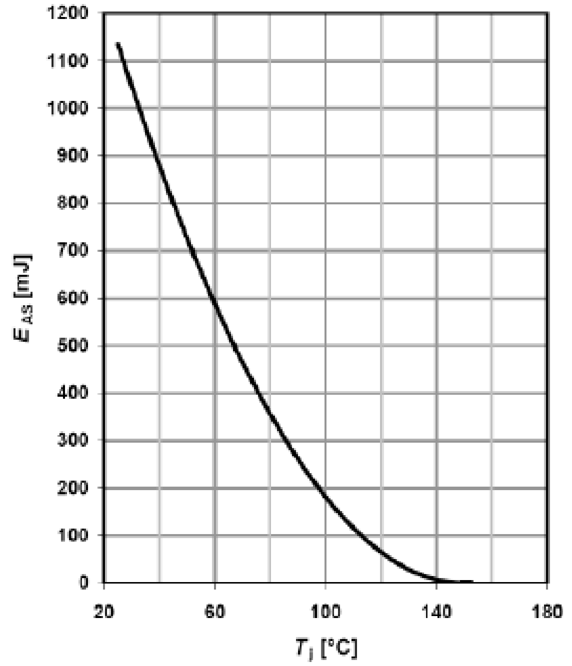
I_D=f(V_{GS}); V_{DS}=40V

Typ. gate charge



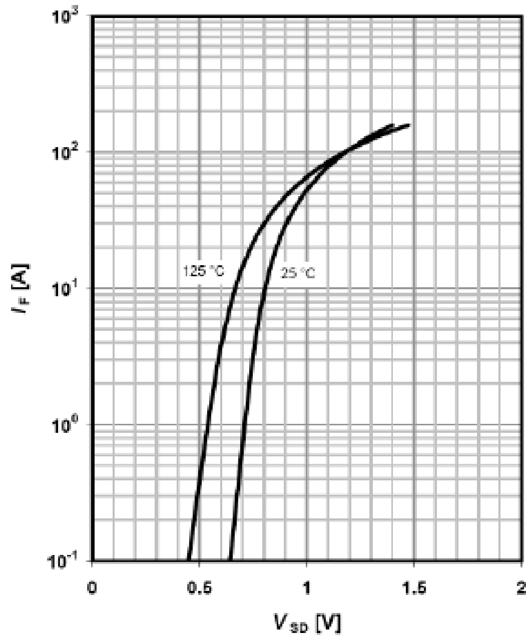
$V_{GS}=f(Q_g)$, $I_D=23A$ pulsed

Avalanche energy



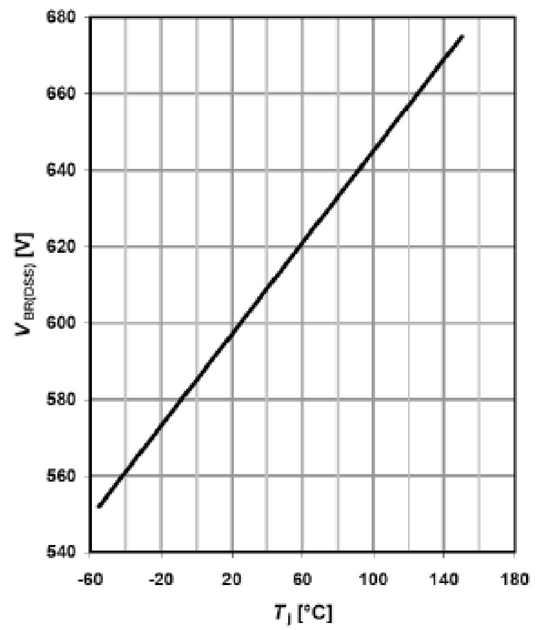
$E_{AS}=f(T_j)$; $I_D=9.3A$; $V_{DD}=50$ V

Forward characteristics of reverse diode

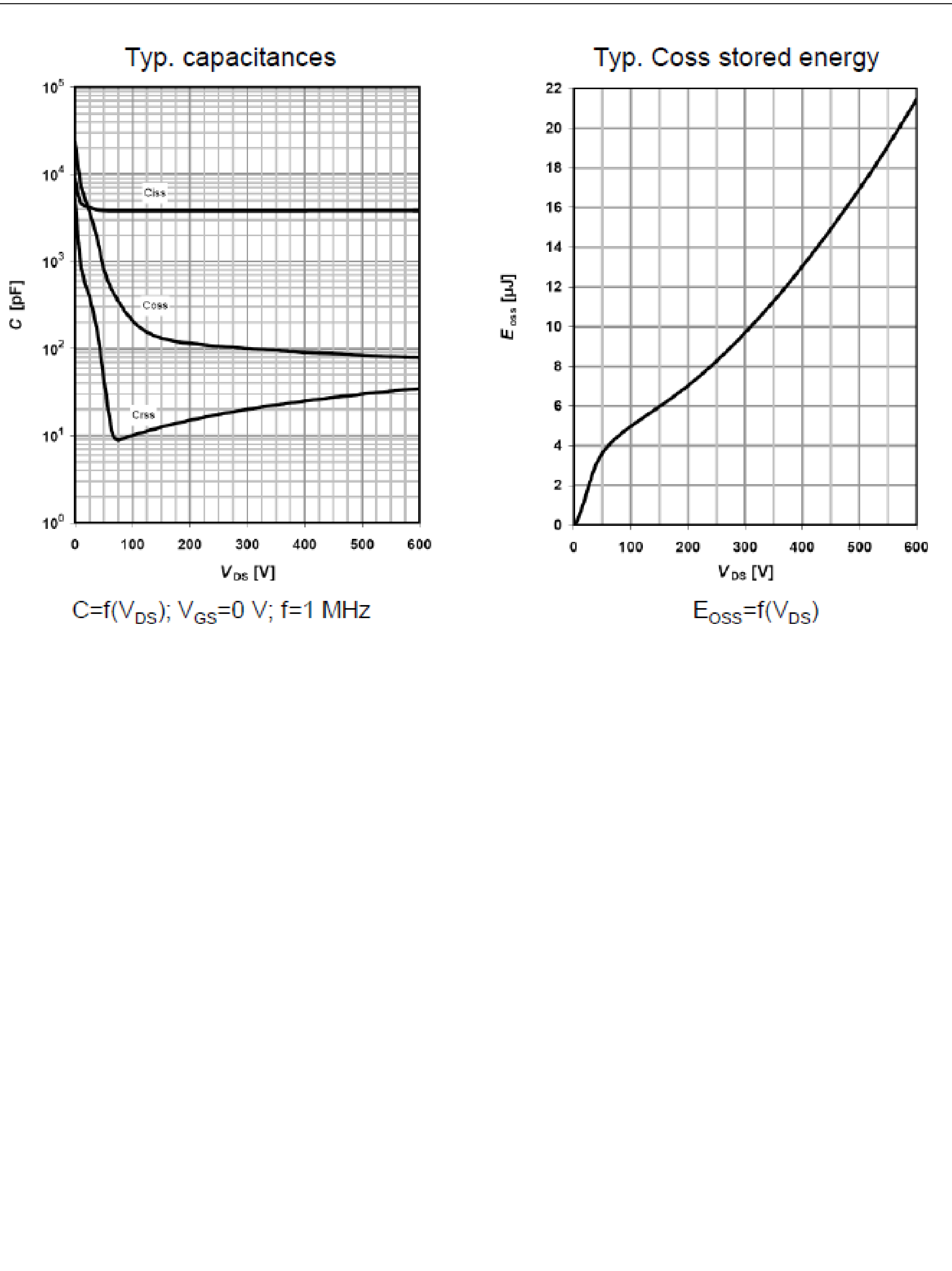


$I_F=f(V_{SD})$; parameter: T_j

Drain-source breakdown voltage



$V_{BR(DSS)}=f(T_j)$; $I_D=0.25mA$



$C=f(V_{DS})$; $V_{GS}=0$ V; f=1 MHz

$E_{OSS}=f(V_{DS})$

Package Outline Dimension

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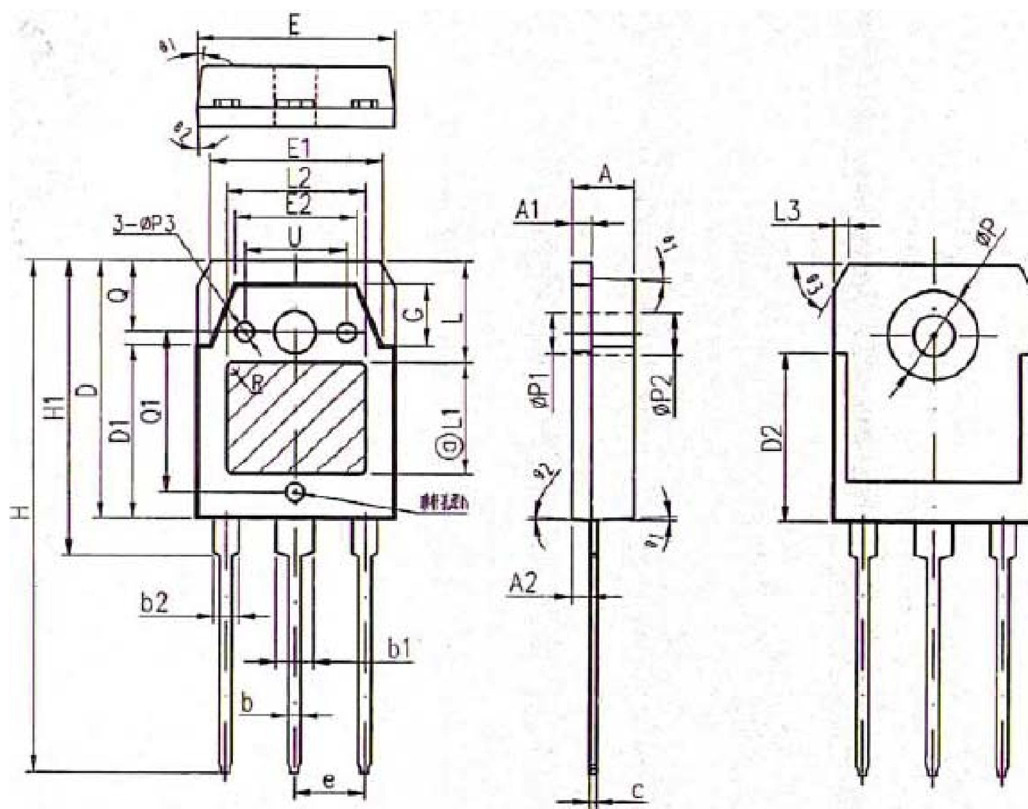

COMMON DIMENSIONS

SYMBOL	MM		
	MIN	NOM	MAX
A	4.60	4.80	5.00
A1	1.40	1.50	1.60
A2	1.33	1.38	1.43
b	0.80	1.00	1.20
b1	2.80	3.00	3.20
b2	1.80	2.00	2.20
c	0.50	0.60	0.70
D	19.75	19.90	20.05
D1	13.70	13.90	14.10
D2	12.90REF		
E	15.40	15.60	15.80
E1	13.40	13.60	13.80
E2	9.40	9.60	9.80
e	5.45 TYP		
G	4.60	4.80	5.00
H	40.30	40.50	40.70
H1	23.20	23.40	23.60
h	0.05	0.10	0.15
L	7.40 TYP		
L1	9.00 TYP		
L2	11.00 TYP		
L3	1.00 REF		
ΦP	6.90	7.00	7.10
ΦP1	3.20 REF		
ΦP2	3.50 REF		
ΦP3	1.40	1.50	1.60
R	0.50 REF		
Q	5.00 REF		
Q1	12.56	12.76	12.96
U	7.8	8	8.2
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	60° REF		

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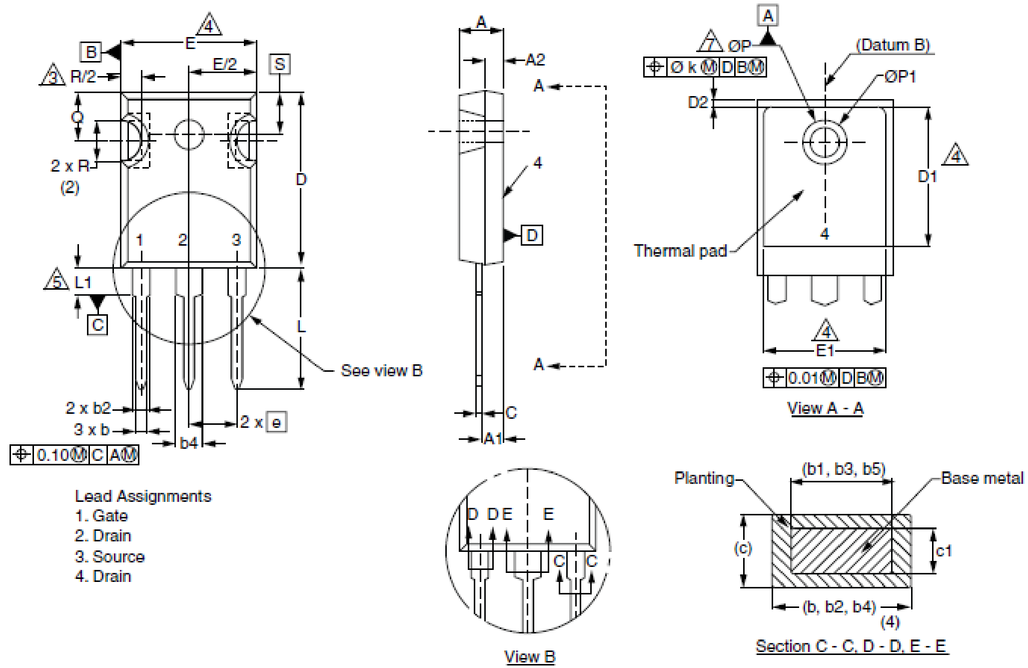
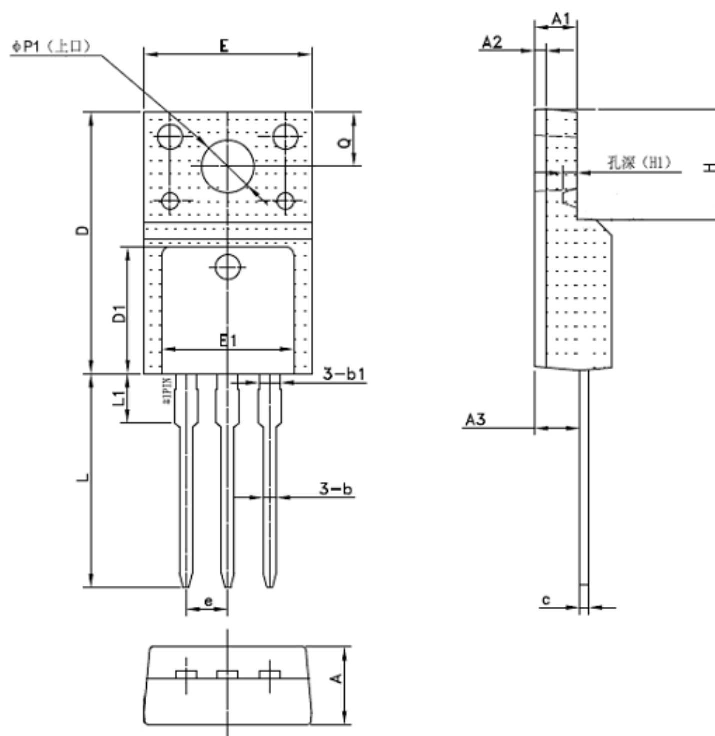


	MILLIMETERS		INCHES	
DIM.	**MIN.**	**MAX.**	**MIN.**	**MAX.**
A	4.58	5.31	0.180	0.209
A1	2.21	2.59	0.087	0.102
A2	1.17	2.49	0.046	0.098
b	0.99	1.40	0.039	0.055
b1	0.99	1.35	0.039	0.053
b2	1.53	2.39	0.060	0.094
b3	1.65	2.37	0.065	0.093
b4	2.42	3.43	0.095	0.135
b5	2.59	3.38	0.102	0.133
c	0.38	0.86	0.015	0.034
c1	0.38	0.76	0.015	0.030
D	19.71	20.82	0.776	0.820
D1	13.08	-	0.515	-

	MILLIMETERS		INCHES	
DIM.	**MIN.**	**MAX.**	**MIN.**	**MAX.**
D2	0.51	1.30	0.020	0.051
E	15.29	15.87	0.602	0.625
E1	13.72	-	0.540	-
e	5.46 BSC		0.215 BSC	
Ø k	0.254		0.010	
L	14.20	16.25	0.559	0.640
L1	3.71	4.29	0.146	0.169
N	7.62 BSC		0.300 BSC	
Ø P	3.51	3.66	0.138	0.144
Ø P1	-	7.39	-	0.291
Q	5.31	5.69	0.209	0.224
R	4.52	5.49	0.178	0.216
S	5.51 BSC		0.217 BSC	

Package Outline Dimension

TO-220F



Symbol	Dimensions(mm)		
	Min.	Typ.	Max.
A	4.50	4.70	4.90
A1	2.44	2.54	2.64
A2	0.60	0.70	0.80
A3	2.56	2.76	2.96
b	0.70	0.80	0.95
b1	-	1.28	-
c	0.45	0.50	0.65
D	15.67	15.87	16.07
D1	-	7.70	-
E	9.96	10.16	10.36
E1	-	8.00	-
e	2.54(BSC)		
H	6.50	6.70	6.90
(H1)	-	(0.81)	-
L	12.48	12.98	13.20
L1	-	2.93	-
ΦP1	2.98	3.18	3.38
Q	3.10	3.30	3.50

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