IceMOS Technology

Preliminary
ICE10M75W4

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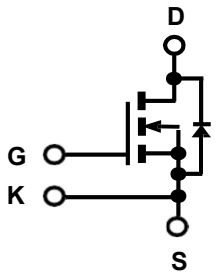
Silicon Carbide Power MOSFET

Product Summary			
I_D	T_A=25°C	152A	Max
$V_{(BR)DSS}$	T_C=25°C	750V	Min
$r_{DS(on)}$	V_{GS}=18V	9.5mΩ	Typ
Q_g	V_{DS}=500V	140nC	Typ

Features

- 750V 9.5mohm SiC MOSFET
- High blocking voltage with low on-resistance
- High-speed switching with low capacitances
- Fast Reverse Recovery
- Optimized design for high performance power systems

RoHS COMPLIANT RoHS (EU) 2015/863 CE HALOGEN FREE Pb Lead Free



TO247-4L

1: D, 2: S, 3: K, 4: G

Maximum ratings [a] , at T_j=25°C, unless otherwise specified

Parameter	*Symbol*	*Conditions*	*Value*	*Unit*
Continuous drain current	I_D	T_c=25°C	152	A
		T_c=100°C	107	
Pulsed drain current	$I_{D,\ pulse}$		608	A
Maximum gate source voltage	$V_{GS(max)}$		-10/+22	V
Operational gate source voltage	$V_{GS\ op}$		-5/+18	V
Power dissipation	P_{tot}	T_c=25°C	416	W
		T_c=100°C	208	
Storage temperature	T_{stg}		-55 to +150	°C
Operating temperature	T_j		-55 to +175	°C

a Pulse width and drain current limited by Tjmax

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	

Thermal characteristics

Thermal resistance, junction-case	R_{thJC}		-	-	0.36	°C/W
Soldering temperature, wave soldering only allowed at leads	T_{sold}	1.6mm (0.063in.) from case for 10 s	-	-	260	°C

Electrical characteristics [a], at T_j=25°C, unless otherwise specified

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V	750	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=20mA, T_j=25°C	2	3.0	4	V
		V_{DS}=V_{GS}, I_D=20mA, T_j=175°C	-	2.2	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=750V, V_{GS}=0V, T_j=25°C	-	0.1	10	µA
		V_{DS}=750V, V_{GS}=0V, T_j=175°C	-	2	-	µA
Gate source leakage current	I_{GSS}	V_{GS}=-10/+22V, V_{DS}=0V	-	-	±100	nA
Drain-source on-state resistance	$R_{DS\ (on)}$	V_{GS}=18V, I_D=80A, T_j=25°C	-	9.5	13	mΩ
		V_{GS}=18V, I_D=80A, T_j=175°C	-	13	-	mΩ
Gate resistance	R_G	f=1 MHz, V_{AC}=30mV	-	5.5	-	Ω

Dynamic characteristics

Input capacitance	C_{iss}	V_{DS}=500V, V_{GS}=0V, f=100 kHz, V_{AC}=30mV	-	5990	-	pF
Output capacitance	C_{oss}		-	364	-	pF
Reverse transfer capacitance	C_{rss}		-	12.5	-	pF
C_{OSS} stored energy	E_{oss}		-	61	-	µJ
Forward transconductance	g_{FS}	V_{DS}=20V, I_D=80A	-	72	-	S
Turn-on delay time	$t_{d(on)}$	V_{DS}=500V, V_{GS}=-5/+18V, I_D=80A, R_G=0.5Ω (External), T_j=25°C	-	20	-	ns
Rise time	t_r		-	30	-	ns
Turn-off delay time	$t_{d(off)}$		-	46	-	ns
Fall time	t_f		-	11	-	ns
Turn-on switching energy	E_{ON}		-	321	-	µJ
Turn-off switching energy	E_{OFF}		-	232	-	µJ

Parameter	Symbol	Conditions	Values			Unit
			Min	Typ	Max	
Dynamic characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DS}=500V, V_{GS}=-5/+18V, I_D=80A, R_G=0.5Ω (External), T_j=175°C	-	18	-	ns
Rise time	t_r		-	29	-	
Turn-off delay time	$t_{d(off)}$		-	57	-	
Fall time	t_f		-	12	-	
Turn-on switching energy	E_{ON}		-	314	-	µJ
Turn-off switching energy	E_{OFF}		-	243	-	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DS}=500V, I_D=80A, V_{GS}=-5 to +18V	-	49	-	nC
Gate to drain charge	Q_{gd}		-	40	-	
Gate charge total	Q_g		-	140	-	
Reverse Diode						
Continuous forward current	I_S	V_{GS}=-5V	-	98	-	A
Diode forward voltage	V_{SD}	V_{GS}=-5V, I_{SD}=40A, T_j=25°C	-	3.8	-	V
		V_{GS}=-5V, I_{SD}=40A, T_j=175°C	-	3.4	-	
Reverse recovery time	t_{rr}	V_{GS}=-5V, V_{RR}=500V, I_{SD}=80A, d_{iF}/d_t=7600 A/µs, T_j=25°C	-	16	-	ns
Reverse recovery charge	Q_{rr}		-	562	-	nC
Peak reverse recovery current	I_{rm}		-	57	-	A
Reverse recovery time	t_{rr}	V_{GS}=-5V, V_{RR}=500V, I_{SD}=80A, d_{iF}/d_t=9100 A/µs, T_j=175°C	-	25	-	ns
Reverse recovery charge	Q_{rr}		-	1272	-	nC
Peak reverse recovery current	I_{rm}		-	84	-	A

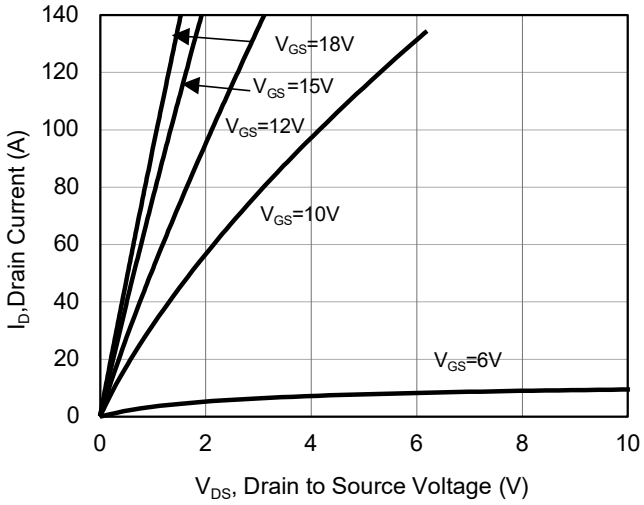


Fig 1. Output Characteristics, T_j=25°C

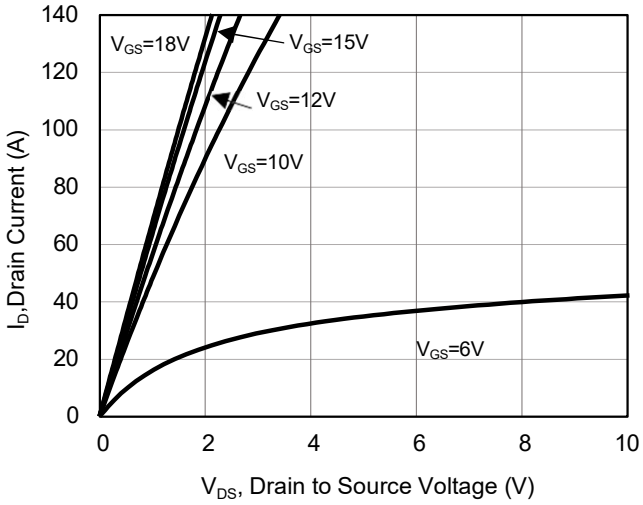


Fig 2. Output Characteristics, T_j=175°C

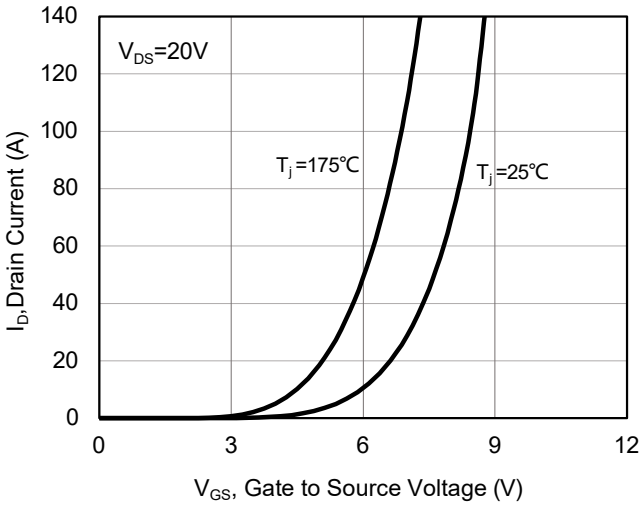


Fig 3. Transfer Characteristics

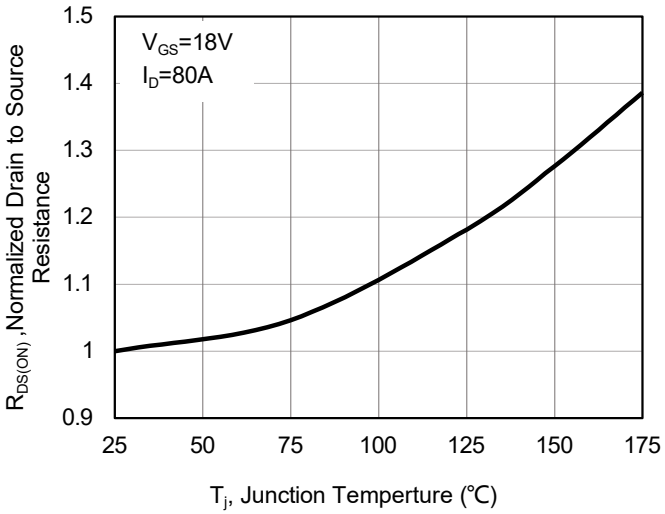


Fig 4. On−Resistance Variation with Temperature

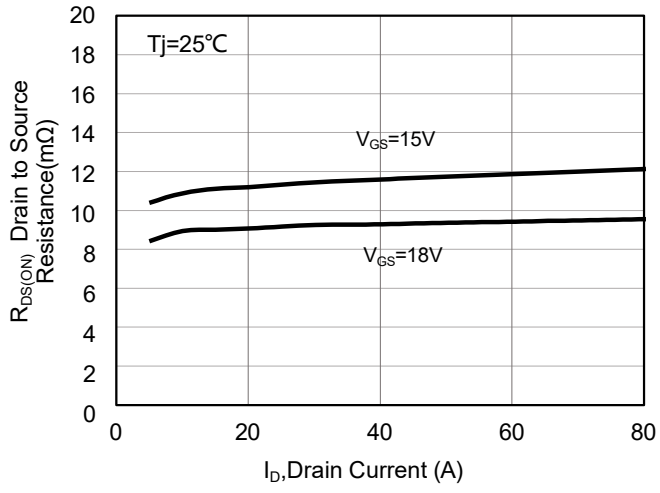


Fig 5. On-Resistance vs Drain Current

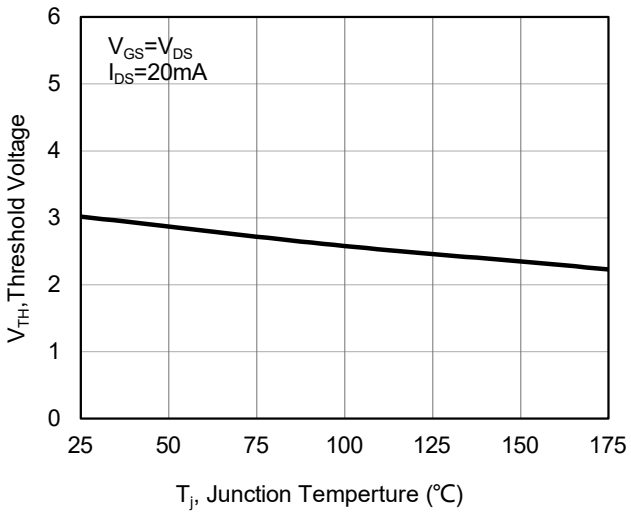


Fig 6. Gate Threshold vs Temperature

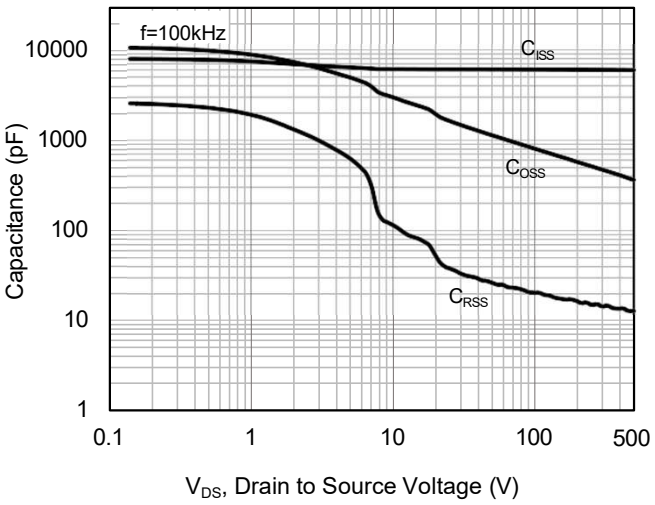


Fig 7. Capacitance Characteristics

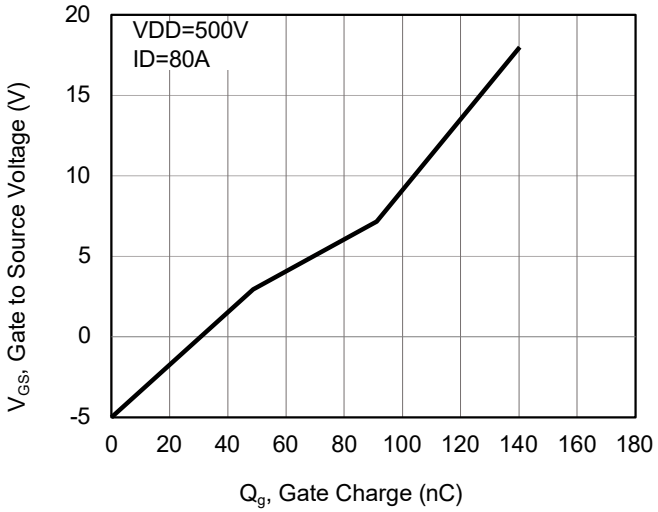


Fig 8. Gate Charge Characteristics

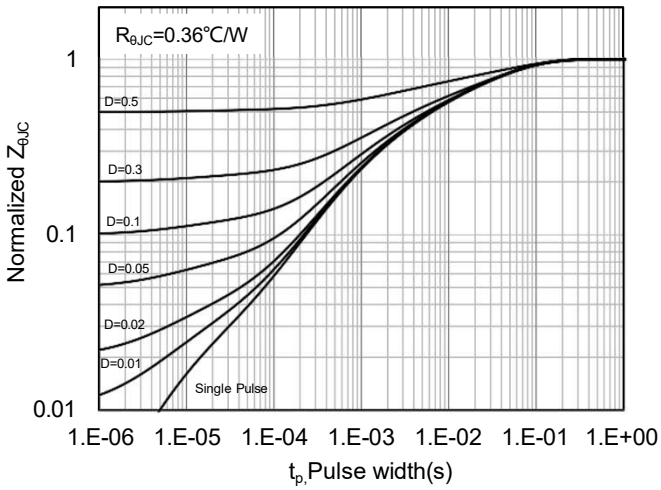


Fig 9. Transient Thermal

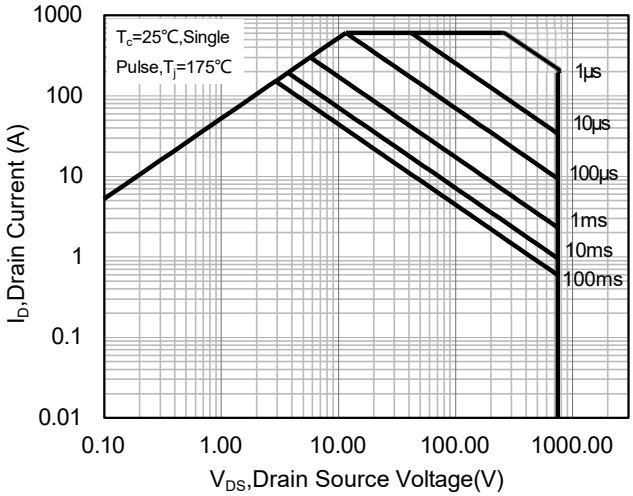


Fig 10. Safe Operating Area

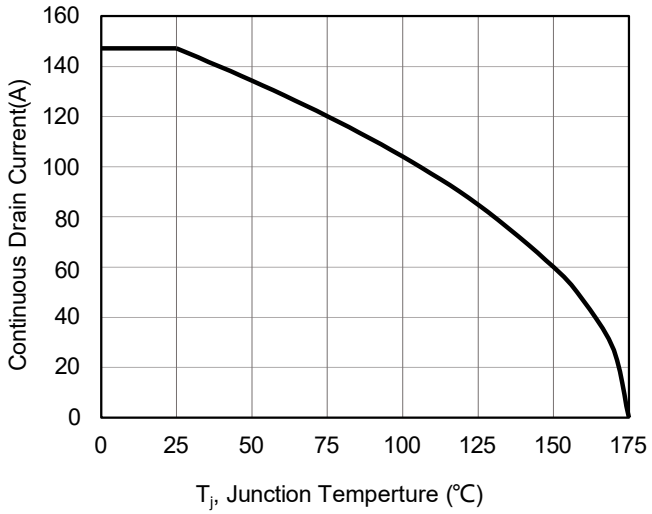


Fig 11. Continuous Drain Current Derating Vs. Case Temperature

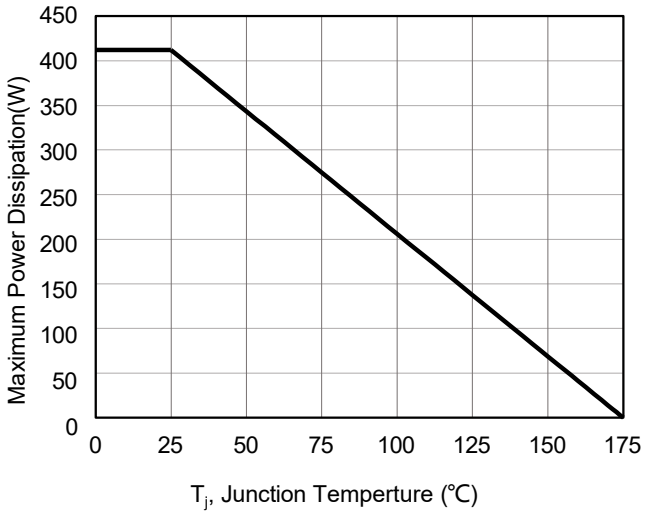


Fig 12. Maximum Power Dissipation Derating vs. Case Temperature

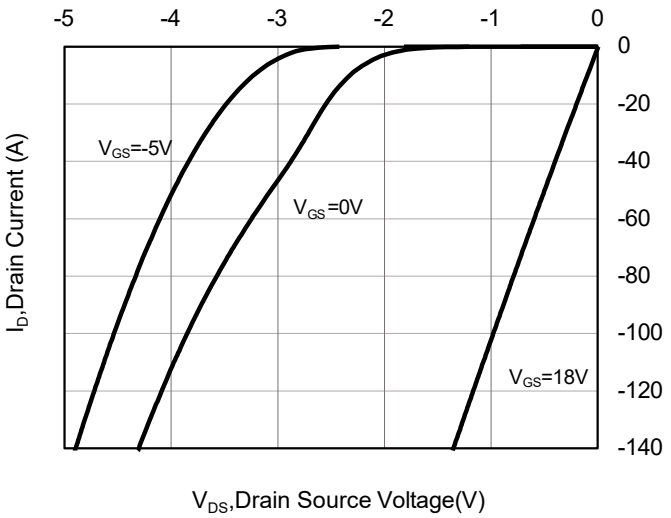


Fig 13. 3rd Quadrant Characteristic at 25 ºC

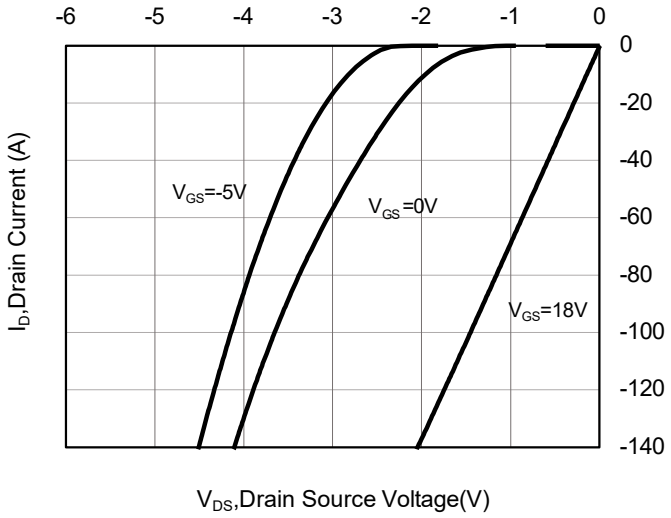
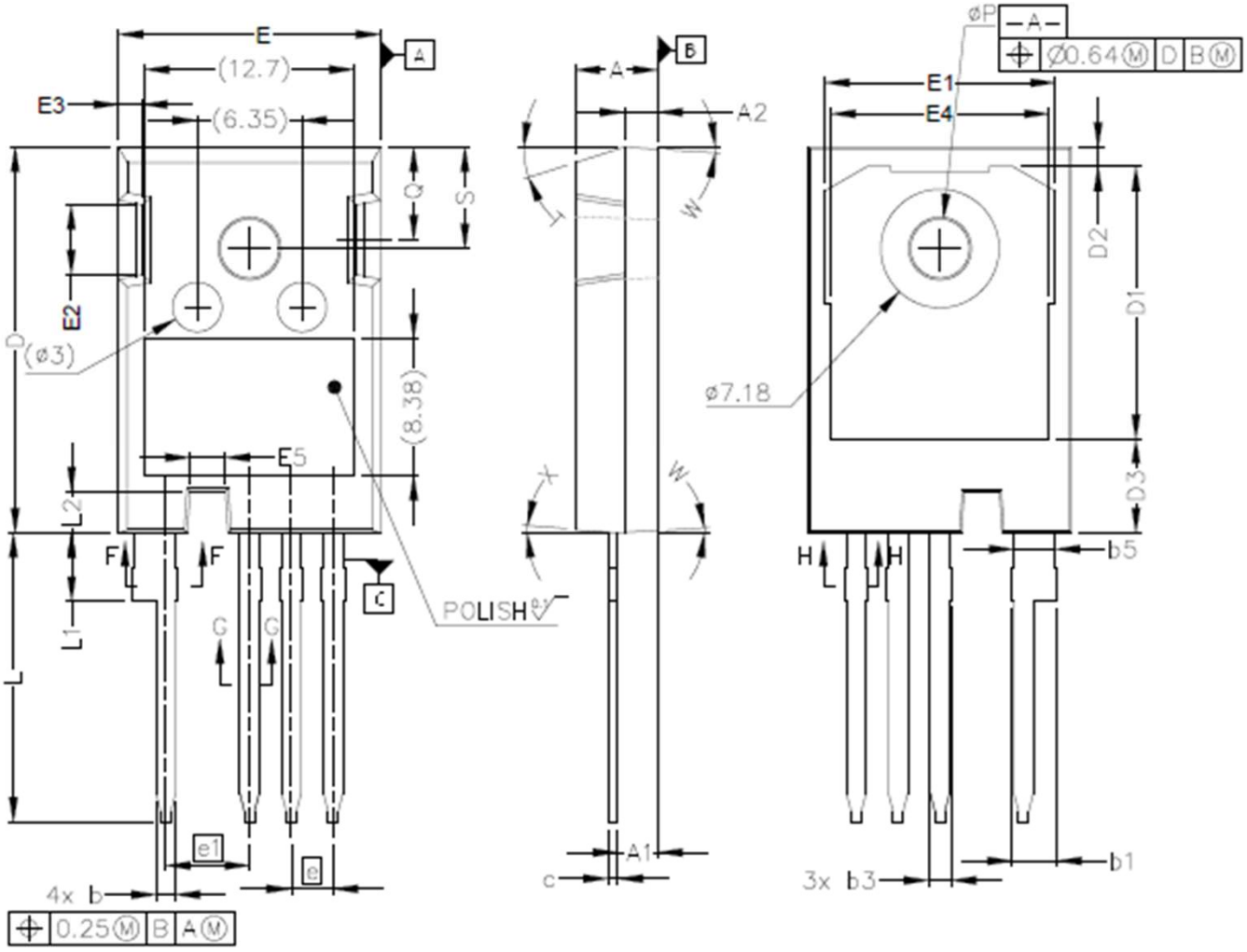
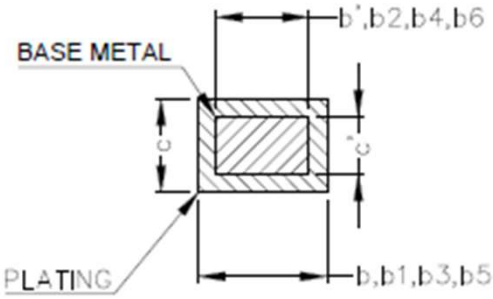


Fig 14. 3rd Quadrant Characteristic at 175 ºC

Package Outline: TO-247-4L





SECTION "F-F", "G-G" AND "H-H"
SCALE: NONE

Package Outline: TO-247-4L

NOTE ;
1. ALL METAL SURFACES: TIN PLATED,EXCEPT AREA OF CUT
2. DIMENSIONING & TOLERANCEING CONFIRM TO ASME Y14.5M-1994.
3. ALL DIMENSIONS ARE IN MILLIMETERS. ANGLES ARE IN DEGREES.

SYMBOL	MILLIMETERS	
	MIN	MAX
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b'	1.07	1.28
b	1.07	1.33
b1	2.39	2.94
b2	2.39	2.84
b3	1.07	1.60
b4	1.07	1.50
b5	2.39	2.69
b6	2.39	2.64
c'	0.55	0.65
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
D3	5.55	6.15
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
E5	1.95	2.35
e	2.54 BSC	
e1	5.08 BSC	
N	4	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
øP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30
T	17.5° REF.	
W	3.5 ° REF.	
X	4° REF.	

Marking Information

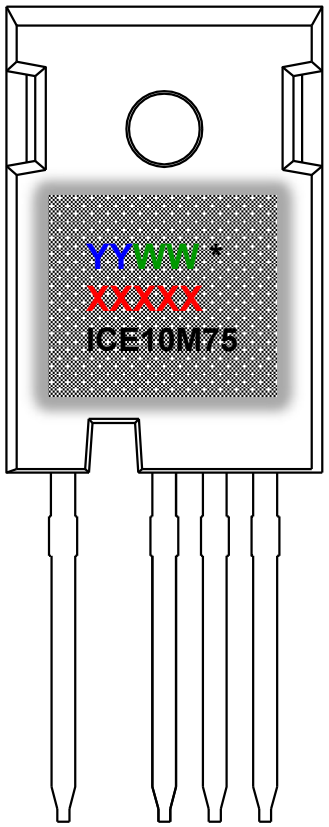
YY = Last two digits of the year

WW = Work week

* = Site ID

XXXXX = Lot ID

ICE10M75 = ICE is IceMOS logo and 10M75 is a designated device part number



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